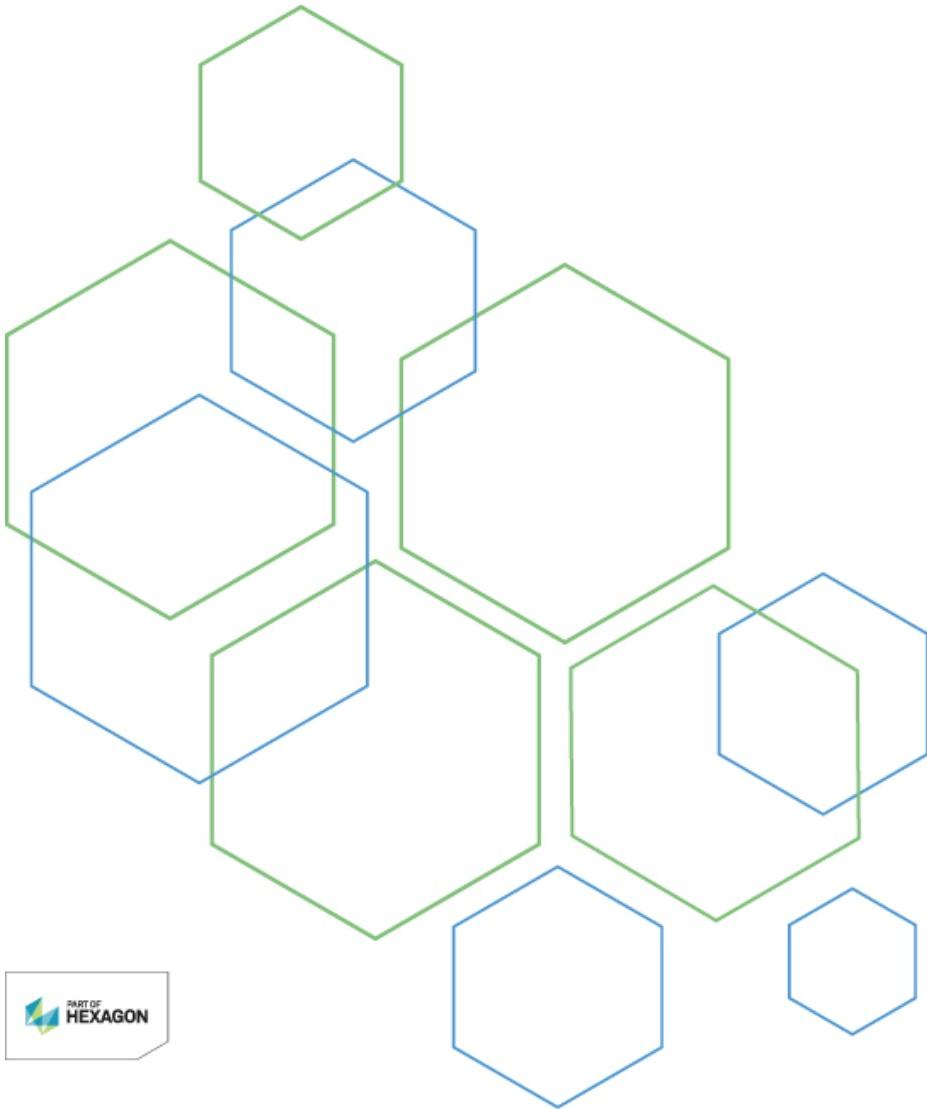


INTERGRAPH®
Smart → 3D
Intergraph Smart 3D
Integration Reference Guide



Version 2016 (11.0)
November 2016

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Preface

This document describes how Intergraph Smart™ 3D works in an integrated environment. This document pulls together information from several other Intergraph Smart™ 3D administrative and user documentation guides. The content includes a list of new features, definitions of terminology, administrative tasks such as installation and configuration, and user tasks such as retrieving and publishing data.

Related Documents

For more information about Smart 3D and integration, please see the following documents.

- *Intergraph Smart™ 3D Installation Guide*
- *Project Management User's Guide*
- *Common User's Guide*
- *Orthographic Drawings User's Guide*
- *Piping User's Guide*
- *Equipment and Furnishings User's Guide*

You can also refer to the SmartPlant® Foundation documentation for more information about integration.

For information about setting up Global Workshare in an integrated environment, please contact Intergraph Support. Visit the web at <http://support.intergraph.com>.

Documentation Comments

For the latest support information for this product, comments or suggestions about this documentation, and documentation updates for supported software versions, please visit *Intergraph Smart Support* (<https://smartsupport.intergraph.com>).

What's New in Smart 3D and Integration

The following changes have been made to Intergraph Smart™ 3D regarding integration with SmartPlant.

Version 2016 (11.0)

- Updated the **Cable Schedule** dialog box with new commands to review the retrieved cables. For more information, see *Cable Schedule Dialog Box* (on page 105). (P1 CR:249012; P2 CR:195222)
- Updated the **Retrieve** dialog box with new options to retrieve documents. For more information, see *Retrieve Dialog Box* (on page 100).
- For 3D Model Data in an integrated environment, select the **Disk only (do not save to database)** setup option to generate the required graphics and data files that can now be published to SmartPlant Foundation. This allows you to save files locally and helps prevent data congestion in a global workshare setup. For more information, see *3D Model Data* (on page 186) and *Setup Dialog Box (3D Model Data Component)* (on page 189). (P2 CP: 266357)

- You can view cable schedule documents in the **Design Basis Viewer**. The **Design Basis Viewer** supports a context menu with convenient commands. The **Design Basis Viewer** is also available when Electrical is active. For more information, see *Design Basis Viewer Command* in the *Electrical User's Guide*. You can access the user's guide using the **Help > Printable Guides** command in the software. (P2 CP:244904)
- Added new information on auto-correlation rules, and how to configure auto-correlation rules. For more information, see *Auto-Correlation* (on page 125). (P3 CP:251640)
- Added support for publishing custom enumerated list data type properties at the document level. For more information, see *General Information about Schema Mapping* (on page 36). (P2 CP: 242426)
- Added support for .NET callbacks. For more information on the delivered callbacks, see *Select and Process Criteria for Publish and Retrieve Mapping* (on page 43). (P2 CP: 278447)
- You can generate SmartPlant Review files using 3D model data and SPRDirect. However, you can only publish these files to SmartPlant Foundation using 3D model data within Smart 3D. For more information, see *Using SPRDirect* (on page 213). (P2 CP:285920)
- The software supports publishing data from a Satellite location for all levels of access. Previously, the software required you to have write access. For more information, see *Combining SmartPlant Foundation and Global Workshare* (on page 16). (P2 CP:242441)
- A new utility, **Configure Project Settings for Drawings**, allows you to specify the issue and revision mode for all drawings in a project. For more information, see *Configure Project Settings for Drawings* in the *Project Management User's Guide*. You can access the user's guide using the **Help > Printable Guides** command in the software. (P3 CP:262942)

SECTION 1

Smart 3D in an Integrated Environment

Using Intergraph Smart™ 3D in an integrated environment allows you to re-use data in Smart 3D that has already been typed into authoring tools such as SmartPlant® P&ID and SmartPlant Instrumentation.

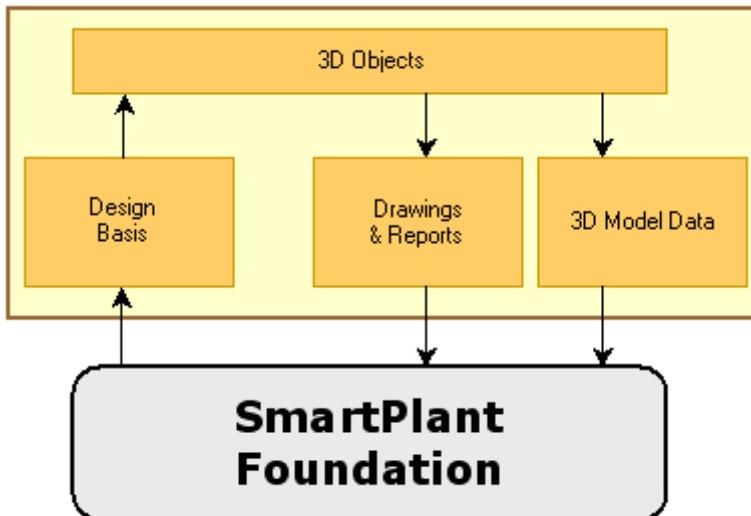
In this integrated environment, data is published to and retrieved from a central repository. During a publish operation, drawings, reports, or 3D model data is sent to the repository. During a retrieve operation, the design basis is brought into the software and then related to 3D objects. Design basis is the term used for piping, instrumentation, electrical, and equipment data from other applications outside Smart 3D.

The role of SmartPlant Foundation is crucial in an integrated environment, not only from the standpoint of managing the transfer of the data but also setting up the project structure.

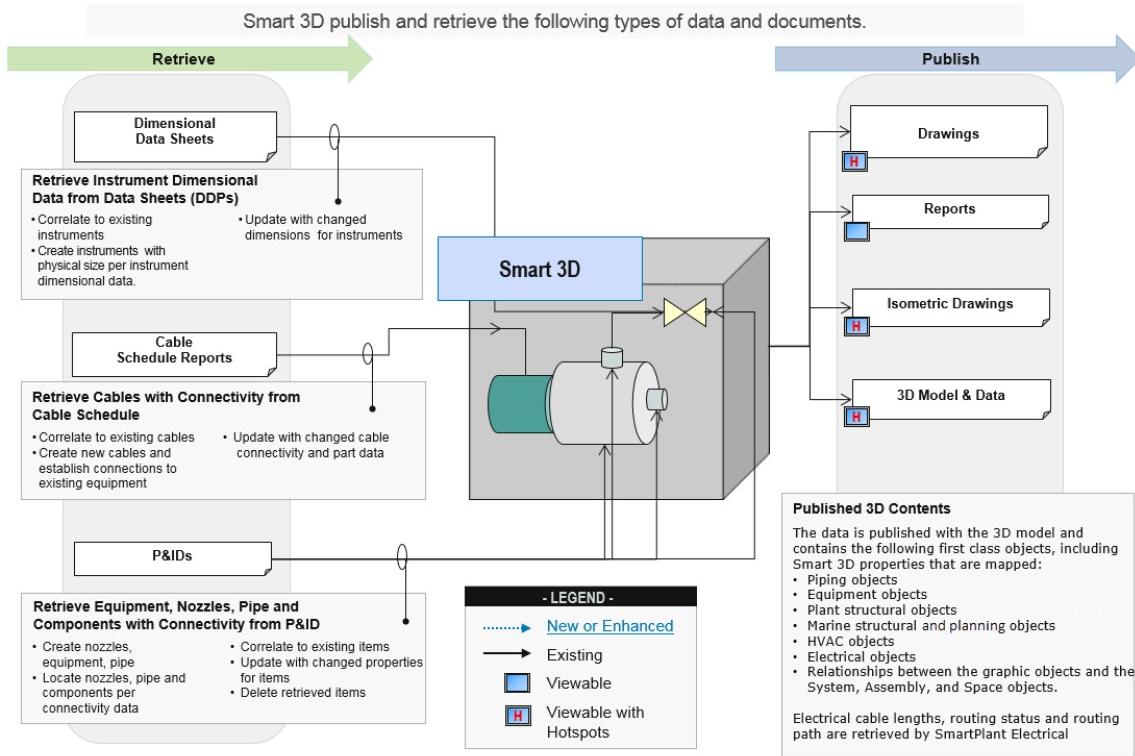
Before any project work is created, the project structure must be created in SmartPlant Foundation and then published. The published structure is then retrieved into the authoring tools. The retrieval of this PBS (Plant Breakdown Structure) automatically creates the same structure in the tools. Then, when data is created in the authoring tools, the publish functionality automatically groups items in SmartPlant Foundation to that structure and builds relationships among the data within that PBS. For more information, see *Retrieving Data* (on page 98) in the *Integration Reference Guide*. The PBS can also be created directly in the 3D model. For more information, see *Creating a Plant Breakdown Structure without Retrieving a PBS Document* (on page 104) in the *Integration Reference Guide*.

If a new area or project is created in an authoring tool, but not in SmartPlant Foundation, a publish operation places that data at the top level of the plant in SmartPlant Foundation.

The following graphic shows the publish and retrieve operations along with the central repository (SmartPlant Foundation) in a conceptual manner.



The following graphic shows a more detailed view of the publish and retrieve operations. You can see the flow of data and the different types of data.



- Smart 3D can retrieve P&IDs, SmartPlant Electrical cable schedules, SmartPlant Instrumentation DDP files, Plant Breakdown Structure (PBS). The retrieved information assists you in creating and modifying objects in the model. For example, after you retrieve a P&ID, you can use the P&ID Viewer in Smart 3D for guidance when routing pipe, inserting components and instruments, and placing equipment in the 3D model.
- In the Smart 3D Drawings and Reports task, you can publish orthographic drawings, isometric drawings, drawings by rule, and reports as view files. The view files include relationships to the 3D model data. You can publish 3D model data for use with SmartPlant Foundation and SmartPlant Review. The 3D model data can include data related to the orthographic, isometric, and report documents. For more information, see the *Drawings and Reports Help*.
- SmartPlant P&ID interfaces with Smart 3D Catalog data through the Remote Piping Specification data. This connection allows the P&ID user to validate components against the catalog data before you retrieve it in Smart 3D. Remote Piping Specifications require additional setup in Smart 3D and P&ID. Please refer to the *SmartPlant P&ID Utilities Guide* for more information.

Intergraph Work Process Guides

Intergraph Work Process guides map the process, power, and marine industries' basic work processes to SmartPlant Enterprise and SmartMarine Enterprise solutions. This documentation helps your organization transition from previous work practices to using Intergraph tools as the new way of executing projects. These documents are available on

<https://smartsupport.intergraph.com> (<https://smartsupport.intergraph.com>) under **View Documentation > Work Process Guides**.

Enterprise Work Processes describe an entire engineering discipline or process at two different levels, including:

- Providing a swim lane diagram to define the typical roles and high-level processes involved in a project
- Showing how Intergraph tools are used to produce required deliverables

Integration Capability Statements describe a specific work process among a set of Intergraph tools, including:

- Explaining the out-of-the-box capabilities of the tools and their recommended use
- Providing a swim lane diagram to show how the tools interact in the work process
- Stating critical requirements and precautions

Enterprise Work Processes and Integration Capability Statements offer a better understanding of how Intergraph tools work together and how to adapt the tools to improve existing work processes.

Understanding Integration Terminology

In the context of integration, certain terms carry a specific connotation for their usage with Smart 3D. The following terms are used frequently when you use the software.

- **Work Breakdown Structure (WBS)** - The composition of the model based on the construction work to be completed. The model occupies the top level of the hierarchy (area), followed by projects, contracts, and documents.
- **Area** - A group of work organized primarily by geographic position relative to a named volume or area to which you can assign a relationship.
- **Project** - The scope of work approved for capital expenditure; a financed set of work (that is, a job). Normally, a project begins in the design world and then progresses to the physical world when the actual construction is approved.
- **Contract** - A specific contract to the fabricator or erector. You can associate published documents to a contract and then reassign the document from one contract to another. You can also assign documents to multiple contracts.
- **As-built** - Describes the computer model intended to accurately represent the physical model as it was built (constructed). Objects in the as-built model contain property values (for example, contractor or industry commodity codes) that associate the model objects to physical objects in the model. The accuracy of this model depends on the incorporation of changes based on changes made in the actual model during construction. If no such changes are made, the model is "as-designed."
- **As-designed** - Describes the computer model that depicts the design of the physical model. This model does not use property values (that is, serial numbers) but identifies objects by a tag number or actual location. Currently, the authoring tools update the as-designed model, not the as-built model.
- **As-is** - Describes the set of physical objects that actually exist in the model. The as-is model is not a computer model but a physical entity.

- **Design Basis** - A collection of objects that represent the pieces of data from other authoring tools outside of Smart 3D.
- **Design object** - Any object that you can select with a property page. An object can be related to one or more contracts of different types. Or, you can limit this relationship to only one contract of a given type, by setting the **Exclusive** property.
- **Part** - An object managed for production by a unique identity.
- **Assembly** - A set of parts, using a unique identity, grouped together for production purposes.
- **Pipe spool** - A set of piping parts assembled in a workshop and installed as a unit in the field. Typically, a pipe spool represents the lowest level assembly of piping parts. The Piping task includes commands to automatically define the spool groupings based on rules.
- **Pipe run** - A piping path with the same nominal pipe diameter (NPD). The contents of a pipe run use the same specification and have the same service.
- **Pipeline** - A collection of pipes and components that form a distribution system.

Hierarchy for Work Breakdown Structure

The organization of components in the Work Breakdown Structure (WBS) differs between an owner/operator company and an engineering, procurement, and construction (EPC) company.

The hierarchy for an owner/operator WBS is as follows. In the graphic, notice that the as-built and project objects share the same level.

- Plant
 - As-built
 - Project
 - Contract

An EPC has the following hierarchy for WBS:

- Plant
 - Area
 - Unit
 - Assembly
 - Part

See Also

Retrieve Documents (on page 102)

Design Basis Explanation

When working with Smart 3D in an integrated environment, you often hear the term "design basis." The design basis is a collection of objects that represent the pieces of data from other authoring tools outside Smart 3D. Smart 3D's role then is to add graphical meaning to that data.

For example, consider the following pump: its name is P-100, it is a horizontal centrifugal pump, its maximum operating temperature is 80 degrees C, it includes a 250 mm suction nozzle and a 200 mm discharge nozzle, and so on. You know several pieces of data about the pump, but you still do not know exactly what it looks like. You then place a pump in the 3D model. Now, all of the data provided about the pump (the design basis) is correlated to the 3D model. The design basis for and rendering of the pump are at least two different objects (there may be more), but they are related to each other in such a way that the pump is more completely understood.

The Generate Design Basis tool generates the metadata for design basis objects. In the previous example, the metadata for the pump includes properties for identification, physical attributes, process requirements, responsibility for construction, and so forth. That information is derived directly from a set of schema files: EFSchema, PIDComponentSchema, WBSCOMPONENTSchema, and so forth. The Generate Design Basis tool translates the information to a form that Smart 3D can understand.

The correlation between the Smart 3D rendering of the pump and the design basis object for the pump can be in a few different states:

- Uncorrelated (the 3D pump is not related to the pump design basis).
- Correlated, but the data does not agree (the 3D pump may be black, but the pump design basis says that it is white).
- Correlated and the data agrees (everything is okay).

For the Uncorrelated case, generally the design basis is selected, and then the 3D object is selected. However, if you have 3D objects already existing in the model, you can relate the two objects using the **SmartPlant > Correlate with Design Basis** command.

If the objects are Correlated and the data disagrees, the viewer indicates this situation. You can compare with the design basis and see the difference. Then, you can take whatever action is needed to make the 3D object match the design basis object, perform a selective update, or perform an approve inconsistency. It may be trivial, like changing the pump coating requirement, or it may be more complicated, like changing the type of pump. The changes depend on how much these objects disagree.

Direct Integration

Direct integration refers to exporting and importing data from tool to tool without using SmartPlant Foundation data management features such as data mapping and file storage. For example, you might export a drawing file from Smart 3D and import it into SmartSketch for viewing. In addition, SPRDirect offers another integration method involving the transfer of data directly from Smart 3D to the SmartPlant Review application through the use of a spreadsheet report.

For more information about the different types of integration, see the *SmartPlant Enterprise Overview*, delivered with SmartPlant Enterprise.

Export and Import

The following lists describe the data that can be exchanged with Smart 3D in direct integration.

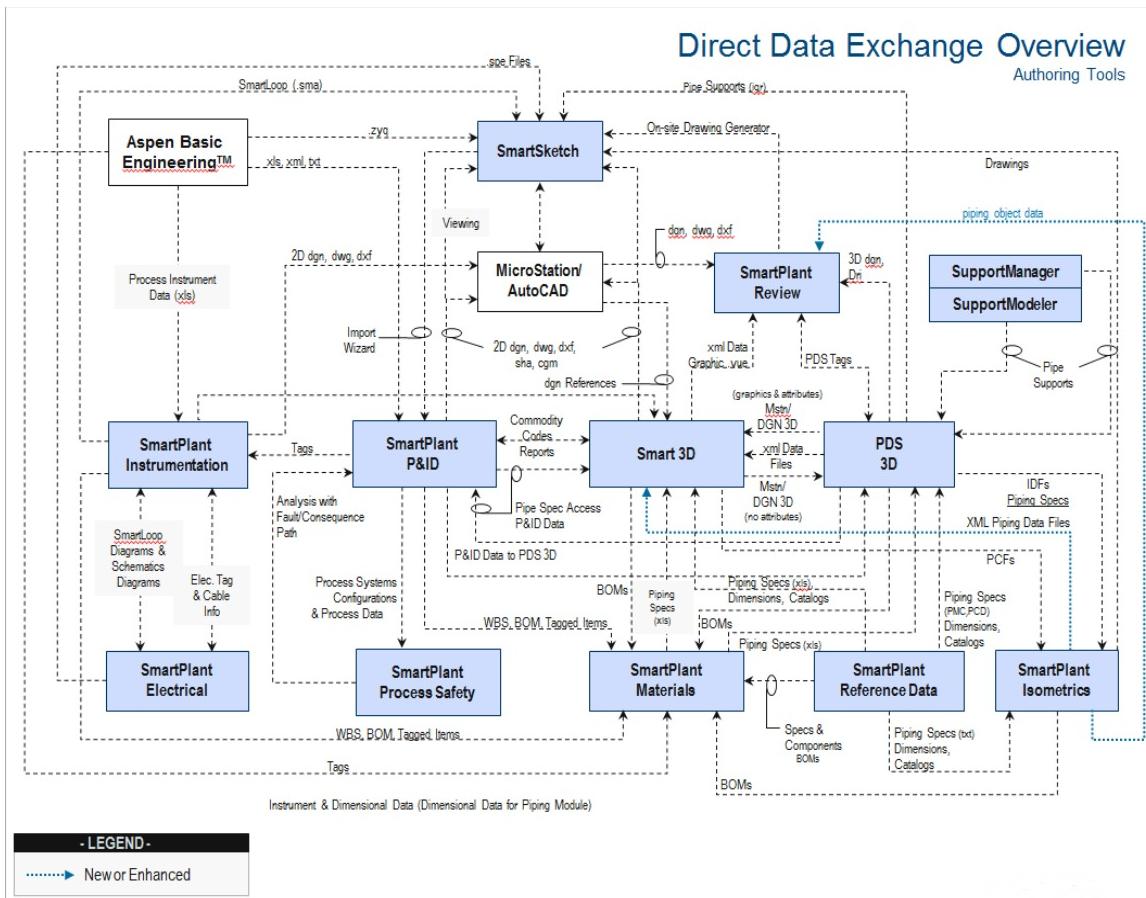
Export from Smart 3D

- 2D dgn, dwg, dxf, sha, cgm files to SmartSketch
- xml data files and vue graphic files to SmartPlant Review
- MicroStation and 3D dgn files (no attributes) to PDS 3D
- commodity codes and reports to SmartPlant P&ID
- nesting reports to SmartPlant Materials

Import to Smart 3D

- dgn reference files from MicroStation/AutoCAD
- MicroStation and 3D dgn files (graphics + attributes) from PDS 3D
- xml data files from PDS 3D
- xls files (piping specifications) from SmartPlant Materials
- piping specification access data from SmartPlant P&ID

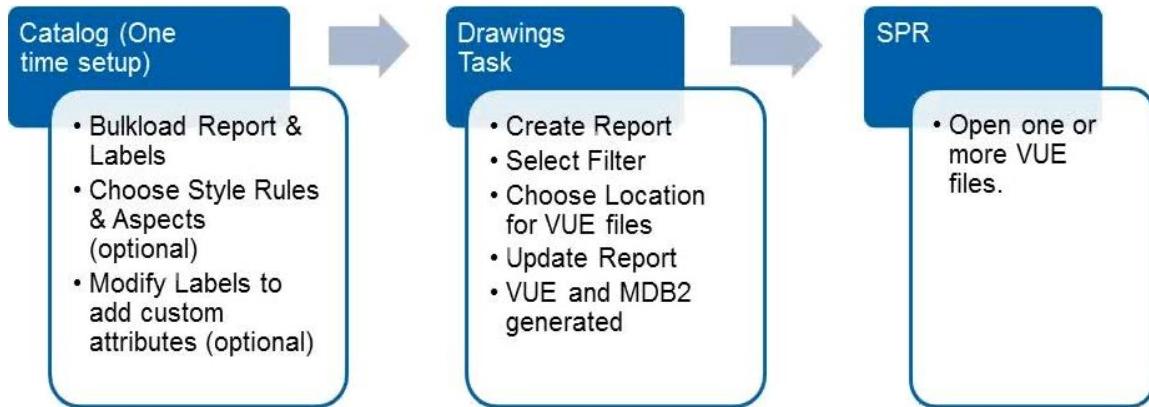
- commodity codes reports from SmartPlant P&ID



SPRDirect

SPRDirect enables you to publish Smart 3D native objects and Smart 3D referenced objects (DGN/DWG, PDS, and Reference 3D, for example) directly to graphic (VUE) and label data (MDB2) files. These files can then be opened in SmartPlant Review. SPRDirect provides a SmartPlant Review spreadsheet report type in Smart 3D that contains labels used to generate the attribute information for SmartPlant Review. This method offers an easier, faster way to get

your Smart 3D project to SmartPlant Review (SPR) where you can interactively review and analyze 3D model data.



Features

In addition to faster data exchange, SPRDirect provides these features:

- You have a WYSIWYG operation in that the attributes you see in Smart 3D can also be seen in SmartPlant Review.
 - The process of adding or removing attributes is simplified.
 - You no longer have to use the additional tools for the data exchange:
 - Schema Editor is not needed for mapping properties on the Smart 3D side.
 - The SP3D Label Selector and the UOM Converter utilities that come with SmartPlant Review are not required.

SPRDirect Components

SPRDirect provides the following components or tools used to complete the process:

- SmartPlant Review spreadsheet template (S3DtoSPRDirect) - Creates the SPRDirect report used to publish a graphic (VUE) file and the attribute data (MDB2) file. The attribute data that goes into the MDB2 file is controlled by the Smart 3D labels. This template along with the Seed.mdb2 is delivered with Smart 3D.
 - ReportSettings.txt - Provides the Smart 3D class-to-label mapping. Edit this file only when you want to add or remove custom labels, and define additional surface style rules and aspects. This file is delivered with your Smart 3D system.
 - MapClassIDToLevelDisciplines.txt - Contains the Smart 3D class ID-to-SmartPlant Review discipline and level mapping. It is used to obtain the SmartPlant Review discipline and level information for the graphic objects while the graphic (VUE) file is being created. This file contains the mapping relations between Smart 3D classes and SmartPlant Review disciplines. Edit this file only if you want to change a discipline name or a level number for the generated VUE file.

Output Files

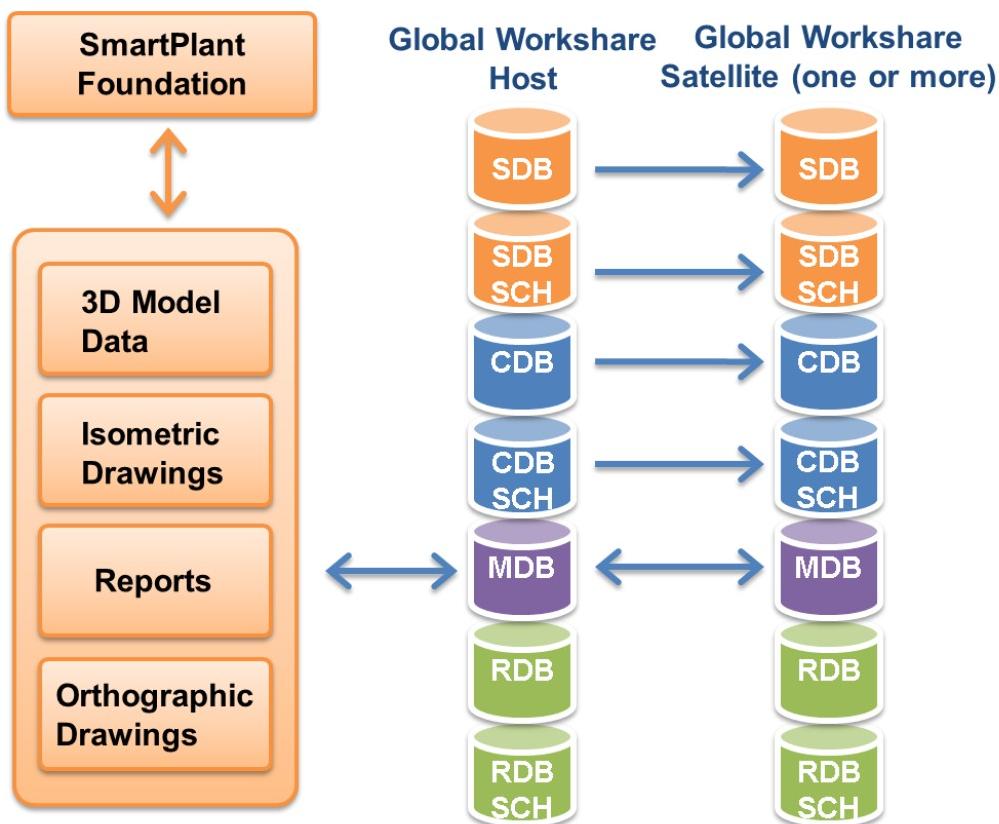
Files that are generated from the update process are listed below. The project file name is the name of the filter that you associated with the report. These files are automatically created into a location that you define.

- *[Project file name].log*
- *[Project file name].VUE*
- *[Project file name].MDB2*
- *[Project file name].iop*

NOTE *[Project file name].iop* is created only if coordination is not selected for the drawing.

Combining SmartPlant Foundation and Global Workshare

In an integrated environment, SmartPlant Enterprise publishes and retrieves data through a central repository, SmartPlant Foundation (SPF). A global workshare configuration (GWC) environment shares all data within one model with multiple remote sites. You can combine the two environments, allowing the use of a central repository at remote sites. A typical configuration is shown below:



The software supports publishing to SPF for all levels of access, write or read-only. For example, you can publish documents in permission groups owned by a Satellite on the GWC Host or another Satellite even if you do not have write permissions in those permission groups.

★ IMPORTANT

- **Revise** and **Update** are available only if you have write access permissions.
- When publishing from other locations, read-only documents cannot be updated with the last published timestamp. The software detects these drawings as new.

The following practices must be followed for effective coordination of SPF and GWC:

1. All data retrieval must be performed on one GWC Host or Satellite. The permission group used for retrieval must only be available on that same Host or Satellite. This prevents a design basis object from being moved so that it has ownership in multiple permission groups and on multiple GWC sites. If this design basis object is later modified, it fails. Despite this restriction, GWC replicates all retrieved objects to all sites. For more information, see *Retrieving Data* (on page 98) in the *Integration Reference Guide* and *Permission Groups* in the *Global Workshare User's Guide*.
2. Smart 3D model registration with the SPF site must be performed on the GWC Host. For more information, see *Register* (on page 22) in the *Integration Reference Guide*.

For more information, see *Publishing 3D Data* (on page 186) in the *Integration Reference Guide*, and *Permission Groups and Global Workshare* in the *Global Workshare User's Guide*.

SECTION 2

Integrating with SmartPlant Enterprise

The following lists include rules that must be followed when using Smart 3D in an integrated environment. Following these rules allows Smart 3D data to be shared correctly with SmartPlant P&ID, SmartPlant Instrumentation, SmartPlant Electrical, and other tools. Other tools that are not listed here have no known Smart 3D integration concerns.

Important Points to Remember

- To ensure piping properties are passed correctly from SmartPlant P&ID to Smart 3D, you must specify the value **SmartPlant 3D** for the **Use Piping Specification** property in SmartPlant P&ID Options Manager.
- For proper P&ID correlation, SmartPlant P&ID and Smart 3D must use the same naming convention for piping components and equipment. For example, piping reducers must use the same name, such as **Concentric Size Change** or **Concentric Reducer**, in both SmartPlant P&ID and Smart 3D.
- The **To Do Lists** in the 2D design basis applications are different from the Smart 3D **To Do List** accessed from the **View** menu. The other tools **To Do Lists** show the tasks required to update information in an integrated SmartPlant environment. Specifically, these **To Do Lists** aid in retrieving data by providing a list of all the items that must be added, deleted, or modified in the tool. The Smart 3D **To Do List** shows inconsistencies in the model when one of two situations occurs: 1) an object has lost a relationship with another, required object, or 2) an object becomes outdated due to permission constraints when you modify a relationship in the model. Items that could appear in the **To Do List** are flow direction problems, invalid connections, or parts not found.
- You should use the Smart 3D **To Do List** along with the P&ID Viewer to ensure that all inconsistencies are corrected in the model and in the design basis.
- You can run a report in Smart 3D that lists items on the SmartPlant **To Do List**. Click **Tools > Run Report** and open the **Diagnostic** folder; select **Diagnostic 3D To Do List Entries**, and click **Run**. Before running the report, you need to check data consistency on the model database server. For more information, see the *Database Integrity Guide*, available from **Help > Printable Guides**.

 **NOTE** There are other reports in the **Diagnostic** folder such as the **Diagnostic P&ID Correlated 3D Object** that can be used in an integrated environment.

- After retrieving piping and instrumentation data, you can use the colors in the P&ID Viewer to see what objects have been modified or added to the drawing. After retrieving cable data, you can view a cable schedule document.

Ports

SmartPlant Instrumentation uses physical ports, while SmartPlant P&ID uses logical ports.

When the workflow goes from SmartPlant P&ID to SmartPlant Instrumentation, a **Same As** relationship is created between the ports in SmartPlant. That **Same As** relationship is required by Smart 3D to correctly match the design basis ports to the 3D representation of the ports.

When the workflow goes from SmartPlant Instrumentation to SmartPlant P&ID, however, a Same As relationship is not created in SmartPlant. Without this Same As relationship, the result may be additional ports in Smart 3D. The result also depends on the way SmartPlant P&ID and SmartPlant Instrumentation synchronize the retrieval of data.

If Smart 3D retrieves the DDP before it retrieves the P&ID, there could be four ports in the design basis after the P&ID is retrieved. This causes a design basis mismatch in the 3D model. This is commonly referred to as "the four-port issue". After the four port issue has appeared for an instrument in a 3D model, it cannot be resolved. There will always be mismatched items on the **Compare Design Basis** dialog box for the affected instrument.

To avoid the issue, always retrieve the DDP after you have retrieved the P&ID. If you are unable to avoid the issue and it does appear, synchronize SmartPlant Instrumentation and SmartPlant P&ID, and then have SmartPlant Instrumentation republish the DDP. Smart 3D can then re-retrieve the newly republished DDP and this resolves the issue.

Piping Hierarchy

You can configure the plant breakdown structure (PBS) in the 3D model in two ways:

- Before retrieving P&IDs into the model, retrieve the PBS document to set up the plant/area/unit (PAU) hierarchy. The first three levels of the hierarchy must match between the tools. For more information, see *Retrieving Data* (on page 98) in the *Integration Reference Guide*.
- Configure the PBS directly within the model without retrieving the PBS document. For more information, see *Creating a Plant Breakdown Structure without Retrieving a PBS Document* (on page 104) in the *Integration Reference Guide*.

Piping Data

If you define a piping hierarchy and route pipe before retrieving piping data on a P&ID, you must correlate the existing runs to runs on the P&ID. Here is an example workflow.

1. Model the pipe run before the P&ID is available.
2. Select the existing pipe run in the 3D model.
3. Click **SmartPlant > Correlate with Design Basis**.
4. Select the corresponding run on the P&ID.
5. On the **Compare Design Basis** dialog box, click **Update**. The software moves the pipe run from its existing parent to its new parent.

 **NOTE** You can browse the **Workspace Explorer** to check the system assignment of the run.

For detailed information on using the Piping task in an integrated environment, see the *Piping User's Guide*.

Off-Page Connectors (OPCs)

Off-Page Connectors (OPC) connect multi-page P&ID drawings. Unlike other P&ID elements, the OPC is correlated when the two pipe runs are joined. The actual P&ID symbol is never selected or used for correlation. The main issue to take into consideration when correlating piping with an OPC is that a weld is placed where the two pipe runs meet. Therefore, you should find a logical connection point for this weld in the model to avoid adding an additional unneeded

weld. For more information on correlating a pipe run that is located on multiple drawings, see the *Piping User's Guide*.

Equipment Data

You correlate and update equipment in the Equipment and Furnishings task.

You must correlate existing equipment using a two-step process. Correlate the equipment body first, and then correlate nozzles separately.

NOTE Nozzles correlate at the same time as equipment if they have the same names on the equipment and P&ID.

As with piping, equipment can be built on the fly. For more information about correlating and updating equipment, see the **Correlate Existing Equipment for Use in an Integration Environment** topic in the *Equipment and Furnishings User's Guide*.

Select Lists (Codelists)

The names of select lists in Smart 3D are case-sensitive. When you make a change to a select list in SmartPlant, you must inspect the Smart 3D Catalog Schema database to verify that the change did not create a duplicate entry. Select list values must have an appropriate value, not a zero as a place holder. A zero value causes an error upon validation of the schema.

Permissions

Intergraph recommends that you or your administrator create a separate permission group for users that perform the retrieve operation. Only users from the retrieve permission group should retrieve documents. Following this recommendation prevents ownership issues related to design basis objects.

Smart 3D requires that you have Write permission in order to claim objects to a project. You are not required to have Write permission to the project to modify claimed objects; you only need Write permission to the objects themselves. You must also have Write permission to as-built, which must be in a **Working** status to claim and release claims in Smart 3D.

SECTION 3

Learning about SmartPlant Administrative Functions in the Software

When working with Smart 3D in an integrated environment, an administrator performs the following tasks:

- Installing and configuring the software
- Registering the model
- Updating project status
- Schema mapping
- Integrating catalog data

Configure for an Integrated Environment

Configuring Smart 3D to work in an integrated environment provides a platform for data exchange, sharing, and integration across various software tools, enabling concurrent use and rapid communication among all Smart 3D project participants. Critical information is stored only once in a data-neutral warehouse, eliminating duplication and ensuring that timely, accurate data is always available.

Two steps are required to take advantage of the Smart 3D integration functionality:

1. Install the SmartPlant Client and Schema Component on your Smart 3D workstation computers, as necessary. For more information about installing Smart 3D components, see the *Integration Setup Guide*, available in the SmartPlant Enterprise documentation set.
★ IMPORTANT In order to take full advantage of the Smart 3D integration functionality, you must install the SmartPlant Client and Schema Component on a Smart 3D workstation computer on which the **Project Management**, **Server Connectivity**, and **Piping Specification Remote Access Server** options are installed.
2. Use the **Project Management** task to register your Smart 3D model. For more information about registering models, see the *Project Management User's Guide*, available from **Help > Printable Guides**.

Performing Administrative Tasks in Project Management

Most of the commands that provide access to SmartPlant functionality exist in the common user interface available on the **SmartPlant** menu in the Smart 3D tasks. The SmartPlant commands in the Project Management task allow you to register the model and update the status of projects. Additionally, use the **Generate Design Basis** command in the Project Management task to update the Catalog schema with any changes that are made to the SmartPlant schema.

In the other Smart 3D tasks, you can use the SmartPlant commands to publish and retrieve documents. For example, you can publish orthographic drawings that you create in the Drawings and Reports task, or you can retrieve P&IDs and view them using the P&ID Viewer. You can also publish the entire Smart 3D model for 3D viewing in SmartPlant Foundation or SmartPlant Review.

For more information about setting up and configuring an integrated environment, see the *Integration Setup Guide*, available in the SmartPlant Enterprise documentation set.

See Also

- [Register Smart 3D \(on page 24\)](#)
- [Update Project Status \(on page 29\)](#)

Register

Registers a model database. Each model must be registered before you can connect to the integrated environment to perform any specific tasks, such as publishing or retrieving files. You can register each model only once. To more efficiently distribute design work, you can register multiple 3D models to a single SmartPlant Foundation model.

During registration, the software maps the model and all of the projects associated with it to a single SmartPlant Foundation URL, which points to one SmartPlant Foundation database, and returns a unique signature for the tool/model combination being registered.

NOTE In an integrated environment, the term "model" is synonymous with the top level of the PBS hierarchy.

The **SmartPlant > Register** command displays a wizard that steps you through the following tasks:

- Specifying the node name and virtual folder for the SmartPlant Foundation database.
- Selecting the model you want to register.
- Providing a description for uniqueness when used in a multi-registration configuration.

After the model is registered, the information is added to the **Databases** tab of the **Model Properties** dialog box.

NOTE You must have full control privileges at the model level to access the **SmartPlant > Register** command.

Smart 3D Registration Wizard

Steps you through the process of associating models with a valid SmartPlant Foundation model.

Smart 3D Registration Wizard - SmartPlant Foundation URL

Specifies the SmartPlant Foundation URL to which you want to register your Smart 3D model.

SmartPlant Foundation URL

Specifies the node name and virtual folder of the SmartPlant Foundation database with which to register your model. Use the following format: **http://SPFServer/VirtualFolder**.

Browse

Displays a list of available nodes. After selecting the node name, you must add the name of the virtual folder to the end of the path.

Next

Opens the next page in the wizard: **SmartPlant Foundation Plant**.

 **NOTE** In an integrated environment, the term "plant" is synonymous with the top level of the PBS hierarchy.

Smart 3D Registration Wizard - SmartPlant Foundation Plant

Specifies the SmartPlant Foundation plant to which your model will be registered.

Plant name

Specifies the SmartPlant Foundation plant with which to associate your model. This list reflects the SmartPlant Foundation plants available at the URL that you specified on the previous wizard page.

Next

Opens the next page in the wizard - a tool plant description is required. This field is required to support multi-instance registration, which allows multiple 3D models to be registered to a single SmartPlant Foundation database. The description should distinguish the plant.

Finish

Completes the registration process and closes the dialog. This button is not available until you type a tool plant description.

 **NOTE** In an integrated environment, the term "plant" is synonymous with the top level of the PBS hierarchy.

Smart 3D Registration Wizard – Tool Information

Specifies the tool to register to the SmartPlant Foundation plant.

SmartPlant Foundation - Displays the SmartPlant Foundation site and plant with which you want to associate your model.

Tool ID - Displays the tool that is being registered. This option is read only.

Tool Plant Description - Specifies a unique description for the Smart 3D model that you want to register.

NOTE You cannot use the same description as a Smart 3D model that is already registered.

Registered Tool Plant Description - Displays a list of Smart 3D models that are registered to the selected plant. If the first Smart 3D model is being registered, <none> is displayed. This option is read only.

NOTE In an integrated environment, the term "plant" is synonymous with the top level of the PBS hierarchy.

Register Smart 3D

In order to register a model, you must first configure Smart 3D to work in an integrated environment. For more information, see the *Intergraph Smart™ 3D Installation Guide* available from **Help > Printable Guides**.

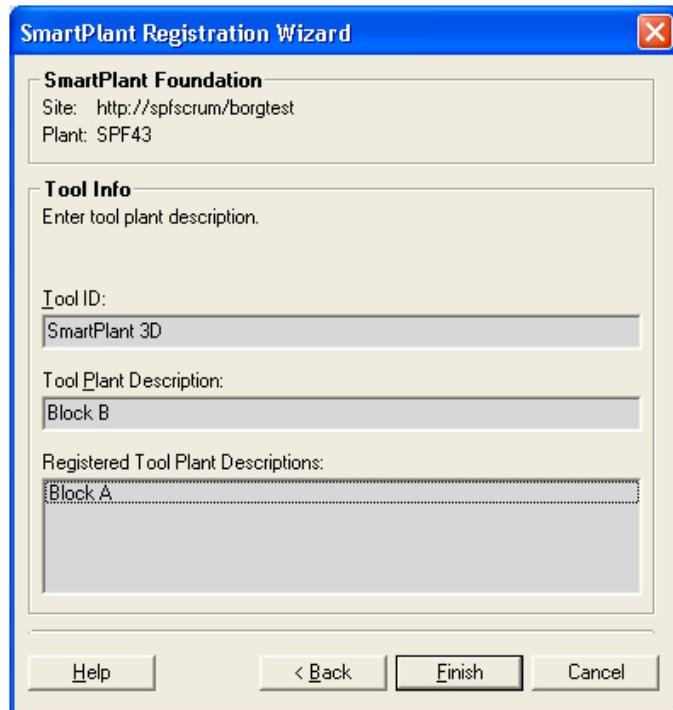
NOTE You must have full control privileges at the model level in order to register a model.

1. In the tree view, click the model database that you want to register, then click **SmartPlant > Register**. You can also right-click a model and select **Register with SmartPlant** on the shortcut menu.
2. On the **SmartPlant Foundation URL** page of the **SmartPlant Registration Wizard**, type the node name and virtual directory of the SmartPlant Foundation database with which you want to register. Use the following format: `http://SPFServer/VirtualDirectory`.

!TIPS

- Click **Browse** to search for the node name. However, you must append the virtual directory to that node name by typing it in the **SmartPlant Foundation URL** box.
 - Replace *SPFServer* with the name of your SmartPlant Foundation Web server.
 - Replace *VirtualDirectory* with the name of the virtual directory for the SmartPlant Foundation Web Client. By default, the virtual directory for the first instance of the Web Client that you install is **SPFASP**. However, if you install multiple instances of the Web Client to connect to multiple databases, the virtual directory name can be different.
3. Click **Next**.
 4. On the **SmartPlant Foundation Plant** page, select from the **Plant name** list the SmartPlant Foundation project to which you want to register your model.
 5. Click **Next**.

6. Type a plant description in the **Tool Plant Description** field.



NOTE If a duplicate description is typed in the Tool Plant Description box, you are prompted to type a unique description.

7. Click **Finish**.

NOTE You cannot register a Smart 3D plant that is already registered to a different SmartPlant Foundation site. You receive the following message. You can register the plant if you use a custom command to remove the registration to SmartPlant Foundation.

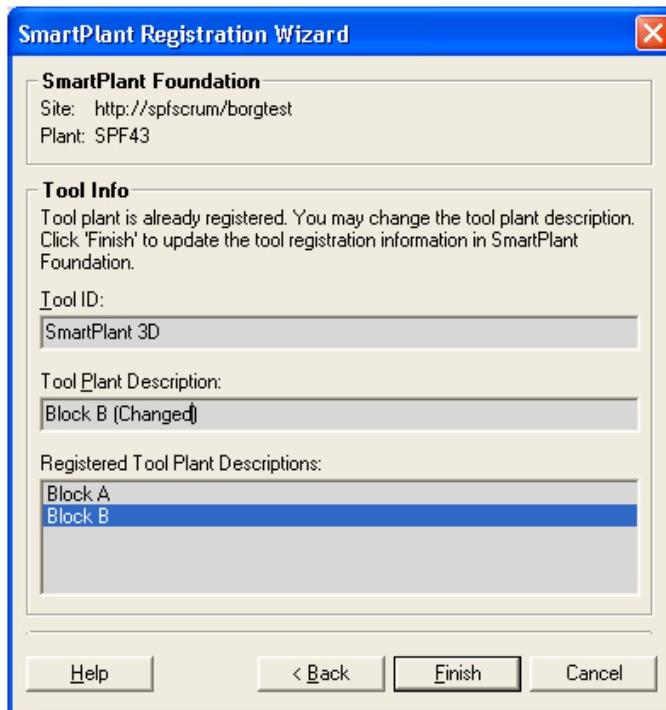


Change a Tool Plant Description

You can change the tool plant description of a registered Smart 3D plant.

NOTE You must have full control privileges at the Plant level in order to register a Plant.

1. In the tree view, click the Plant (Model database) that you want to register, then click **SmartPlant > Register**. You can also right-click a Plant and select **Register with SmartPlant** on the shortcut menu.
A warning displays that the plant is already registered with SmartPlant Foundation.
2. Click **Yes** to modify the registration.
3. Type the node name and virtual directory of the SmartPlant Foundation database with which you registered before, and then select **Next**.
The SmartPlant Registration Wizard – Tool Information dialog box appears.
4. Type a new plant description in the **Tool Plant Description** field.



5. Click **Finish**.

Generate Design Basis

Generates a design basis XML file and updates the associated map files. When you use Smart 3D in an integrated environment, you may need to change the SmartPlant schema to meet the needs of your company. For example, you might want to add a new property to the schema. Changes in the SmartPlant schema need to propagate to the Smart 3D catalog schema database.

To update the Smart 3D catalog schema, you can use the **SmartPlant > Generate Design Basis** command, which creates a design basis package that the software loads into the catalog schema database. The following list shows the steps that the **Generate Design Basis** command accomplishes:

- Read the delivered component schemas.
- Read and modify the design basis map file that is used to create design basis objects during a document retrieve.
- Generate the design basis schema package that is loaded into the Smart 3D catalog schema database.

The **Generate Design Basis** command uses as input the file names of the component schemas and a design basis map XML file. The output of the tool is the design basis package, which the software automatically loads into the Smart 3D catalog schema database.

NOTE If the SmartPlant schema (EFSchema) has been changed, you must generate component schemas in the **Schema Editor** before running **Generate Design Basis**.

Generate a design basis

1. In Project Management, select a catalog in the tree view, and click **SmartPlant > Generate Design Basis**.
2. In the **Select Component Schemas Path** dialog box, specify the path to the modified component schemas.
3. Click **OK**. You can click **...** and navigate to the location.

During processing, the software locates and reads the input schema component XML files and the design basis map file. Next, the software generates the design basis schema package. Finally, the software updates the views on the catalog schema database.

4. Click **OK** on the message box that displays notifying the user that the process is complete.

★IMPORTANT After a model is registered and the Generate Design Basis processing completes, you must generate model views and regenerate the reports database before continuing with the integration workflows. For more information, see Regenerate the reports database.

NOTE To generate views in the model database, perform one of the following actions:

- In Project Management, select the **Synchronize Model with Catalog** command. Check **Regenerate views** and clear all other options. Then click **OK**.
- Run the **View Generator** on the model. The **View Generator** (`ViewGenerator.exe`) is delivered to the `[Product Folder]\Core\Tools\Administrator\Bin` folder. Select the appropriate databases (Model and associated catalog schema).

Reset Design Basis Date and Time Command

Modifies the Design Basis timestamp. With this command, you can set the time and date back to a point in the past.

The design basis timestamp is a critical piece of information used to display the list of documents to be retrieved, to generate delete instructions, and to back up and restore.

You can access this command by clicking **Tools > Custom Commands**. The ProgID for this command is IMSEngFrameworkCmd.EngFrameworkCmd, and the argument is ResetDesignBasisTime.

Reset Design Basis Date and Time

★IMPORTANT To run this custom command, you must have the SmartPlant client installed. For more information, see the SmartPlant Foundation installation documentation.

1. Start the software.
2. Click **Tools > Custom Commands**.
3. Click **Add** on the dialog box.
4. In the **Command ProgID** box, type **IMSEngFrameworkCmd.EngFrameworkCmd**.
5. In the **Command name** box, type text such as **Reset Design Basis**.
6. In the **Argument** box, type **ResetDesignBasisTime**.
7. Click **OK** on the **Add Custom Command** dialog box.
8. Select the command name, and then click **Run**.
9. On the dialog box, click **Change**.
10. Specify a date and time in the past.

Update Project Status

Modifies the status of a project. During a project lifecycle, administrators create projects and manage their administration through the stages of active, complete, and merged with as-built. Occasionally, an administrator will need to cancel projects. The **Update Project Status** command is only available on the **Tools** menu in the Project Management task.

NOTE There are two status types. One is the Active/Complete/Merged/Canceled status on the project as it exists. The other is the Working/Approved status for each object in the project. In this release of the software, the status of the as-built project object must stay set to **Working**. Setting the status of the as-built object project to **Approved** makes it read-only. (For the Project Management environment, commands like **Claim** and **Release Claim** no longer work.)

Status	Project Activities
Active	Create, modify, and delete model objects. Create and publish drawings. Create and publish 3D model documents.
Complete	Change WBS assignments from project to as-built on model objects. Set 3D project status to Merged. Delete project drawings. Perform a final publish of drawings and release claims (Project Management environment only).
Merged	Set 3D project status to Finished.

You can use the options on the **Update Project Status** dialog box to manage the migration of project information back into the as-built model.

NOTES

- The **Update Project Status** command is not supported in an integrated environment.
- In the Project Management environment, after the project administrator creates a new project and registers it, you can begin claiming objects to the project, making modifications, and generating project drawings. When the project team determines that the project is ready to complete, the project leader is notified to **Check Consistency**, which appears in the SmartPlant Foundation **To Do List**.

What do you want to do?

- *Update project status to Complete* (on page 31)
- *Update project status to Merged with As-Built* (on page 32)
- *Update project status to Merged with SmartPlant* (on page 33)
- *Return the status of a project to Active* (on page 34)
- *Cancel a project* (on page 34)

Update Project Status Dialog Box

Provides options for managing project status.

Project name

Lists the names of all of the Smart 3D projects (excluding as-built projects) that are associated with the selected model and that you have write permission to modify.

SmartPlant project status

Displays the status of the active model. Both this field and the **Refresh Status** button are disabled if the active model is not registered with a SmartPlant Foundation project.

Refresh Status

Searches for and displays the current status of this project as it exists in the associated repository. Although the project status is always determined from the design basis, the software checks the SmartPlant Foundation database. When a status mismatch exists, the software displays a message that the inconsistency exists. This button is disabled if the active model or project is not registered.

Return to Active

Returns the **Smart 3D project status** to an **Active** status and publishes the information. This status is the default status when a new project is created. This button is only available when the **Smart 3D project status** is **Completed**, but the **SmartPlant project status**, if applicable, is still **Active**. As an additional safety check, this button automatically calls the **Refresh Status** command to query the status before modifying the Smart 3D status. If the **SmartPlant project status** is found to be **Completed**, then the software displays a message informing you that the project cannot be set back to **Active**.

TIP If the selected Smart 3D project is not registered, then you can return the project status from **Completed** to **Active** without restriction.

Complete Project

Sets the **Smart 3D project status** to **Completed** and publishes this information in preparation for merge with as-built. This status locks the project to read-only for all Smart 3D users. When working in an integrated environment, all engineering tools must publish their status as **Completed** before the Smart 3D status changes to **Completed**. After the **SmartPlant project status** changes to **Completed**, no projects can return to the **Active** status. This button is available only when the **Smart 3D project status** is **Active**, and the **SmartPlant project status** is **Active**. If there is a status mismatch, then the software displays a message informing you to retrieve the latest documents before completing the project. The software checks whether all of the documents to be published and associated to the project are up-to-date, and that they have all been published since they were last updated. The software also checks whether all objects have a status of Approved.

TIP If the selected Smart 3D project is not registered, then you can return the project status from **Active** to **Completed** without restriction.

Merge with As-Built

Sets the **Smart 3D project status** to **Merged**, overwrites the current Smart 3D as-built data with the project version of the data, and, in the Project Management environment, releases

the claims. In Smart 3D, **Merge with As-Built** does not delete the Work Breakdown Structure contracts from the project. Project administrators have the option of keeping or discarding them from the as-built. This button is only available when the Smart 3D project status is **Complete**, and the **SmartPlant project status** is **Completed**.

Merge with SmartPlant

Updates the **Smart 3D project status** to **Finished**. This button is only available when the **Smart 3D project status** is **Merged**, and the **SmartPlant project status** is **Completed**.

Cancel Project

Sets the **Smart 3D project status** to **Canceled**, and publishes the information. In the Project Management environment, this status removes the project from the software. This status does not release claims. No further project status actions are possible at this point. This button is available only when the **SmartPlant project status** is **Canceled**. If the selected Smart 3D project is not registered, then you can cancel the project without restriction.

Project Status Update

After the project administrator creates a new project and registers it, you can begin making modifications and generating project drawings.

 **TIP** For more information about using the software in an integrated environment, see the **Common User's Guide**, available from **Help > Printable Guides**.

When the project team determines that the project is ready to complete, the project leader is notified to **Check Consistency**, which appears in the SmartPlant Foundation **To Do List**. The following steps guide you through the actions required in order to move a project through the stages of **Complete**, **Merge with As-Built**, and **Merge with SmartPlant**.

 **NOTE** There are two kinds of statuses. One is the Active/Complete/Merged/Canceled status on the project as it exists. The other is the Working/Approved status for each object in the project. In this release of the software, the status of the as-built project object must stay set to **Working**. Setting the status of the as-built object project to **Approved** makes it read-only.

What do you want to do?

- *Update project status to Complete* (on page 31)
 - *Update project status to Merged with As-Built* (on page 32)
 - *Update project status to Merged with SmartPlant* (on page 33)
 - *Return the status of a project to Active* (on page 34)
 - *Cancel a project* (on page 34)
-

Update project status to Complete

Before you update the status of a project to **Complete**, you must verify the following:

- All of the project drawings are complete, up-to-date, and published, including the document or set of documents that contain all of the 3D model objects in the project.

- In the Project Management environment, all of the objects that have been claimed to the project have been set to an **Approved** status.

You can create a filter to locate the project objects that are still set to a **Working** status. For more information about filters, see the *Common User's Guide*, available from **Help > Printable Guides**.

You can change the status of a project object using the **Configuration** tab on the object **Properties** dialog box. For more information about object properties, see the *Common User's Guide*, available from **Help > Printable Guides**.

1. In the **Project Management** task, select a model in the **Project Management** tree.
2. Click **Tools > Update Project Status**.
3. In the **Update Project Status** dialog box, select the name of the active project in the **Project Name** list whose status you want to update to **Complete**.
4. Click **Refresh Status** to display the status of the project in the **SmartPlant project status** box.
5. Click **Complete Project**.
6. When processing completes, click **Close**.

NOTES

- If there is a status mismatch, then the software displays a message informing you to retrieve the latest documents before completing the project. The software checks whether all of the documents to be published and associated to the project are up-to-date, and that they have all been published since they were last updated. The software also checks whether all of the objects have a status of **Approved**.
 - If additional changes come in from SmartPlant Instrumentation, SmartPlant P&ID, SmartPlant Electrical, or Zygad while the SmartPlant project is still active, the project status must be set to **Return to Active**, the 3D model updated with those changes, and the drawings regenerated. After all of the tools have confirmed that no more changes are required, follow the steps above to complete the project. For more information on returning the project status to active, see *Return the status of a project to Active* (on page 34).
7. After all of the tools have confirmed that no more changes are required, the project administrator approves the **Check Consistency** workflow step in SmartPlant Foundation, and the SmartPlant project status is set to **Complete**.

⚠ CAUTION The step to approve **Check Consistency** in SmartPlant Foundation is non-reversible; consequently, it is imperative to ensure that no further changes are necessary.

Update project status to Merged with As-Built

After the SmartPlant status updates to **Complete**, the project administrator receives a **To Do List** task in SmartPlant Foundation to **Closeout Tool**, or merge the as-built data.

Prior to performing the following procedure, use the **SmartPlant > Retrieve** command to retrieve the Project List and verify that all of the tools, including SmartPlant Foundation, have their project statuses set to **Complete**. For more information about retrieving documents, see the *Common User's Guide*, available from **Help > Printable Guides**.

After you verify that the status of the project is synchronized with the status of the projects in the other tools, you must delete all the project drawings that will not be a part of the final publish

when you update the project status to **Merged with SmartPlant**. For more information about deleting drawings and performing a final publish, see the *Orthographic Drawings User's Guide*, available from **Help > Printable Guides**.

1. In the Project Management task, select a model in the Project Management tree.
2. Click **Tools > Update Project Status**.
3. In the **Update Project Status** dialog box, select the name of the project in the **Project Name** list whose status you want to update to **Merged with As-Built**.
4. Click **Refresh Status** to display the current status of the project in the **SmartPlant project status** box.
5. Click **Merge with As-Built**.
6. When processing completes, click **Close**.

NOTE In the Project Management environment, the **Merge with As-Built** process overwrites the current as-built data with the project version of the data, but without the corresponding unclaimed operation.

Update project status to Merged with SmartPlant

The first part of this procedure is performed in the **Drawings and Reports** task and is completed in the **Project Management** task.

1. Set **Active Project** on the Drawings and Reports toolbar to the as-built WBS item, and use the **Update** command to update the remaining drawings in preparation for the final publish.
2. Set **Active Project** on the Drawings and Reports toolbar to the WBS project name, and use the **SmartPlant > Final Publish** command to publish all of the drawings and documents from the root model node.

† TIPS

- **Final Publish** is only enabled when the SmartPlant project status is set to **Complete**, and the project status is set to **Merged**.
- For more information about **Update** and **Final Publish**, see the *Orthographic Drawings User's Guide*, available from **Help > Printable Guides**.

3. In the **Project Management** task, select a model in the **Project Management** tree.
4. Click **Tools > Update Project Status**.
5. In the **Update Project Status** dialog box, select the name of the project in the **Project Name** list whose status you want to update to **Merged with SmartPlant**.
6. Click **Refresh Status** to display the current status of the project in the **SmartPlant project status** box.
7. Click **Merge with SmartPlant**.
8. After processing completes, click **Close**.
9. In SmartPlant Foundation, approve the workflow step to **Closeout Tool**.
10. In the **Drawings and Reports** task, retrieve the Project List and verify that the status of all of the projects is set to **Finished**.

11. In SmartPlant Foundation, verify that the Claims Report does not contain any project objects.

NOTE After all tools approve the workflow step to **Closeout Tool**, an automation script performs an error check. If errors are found, then SmartPlant Foundation initiates the ProjectCompleteReject workflow and sends additional tasks to the SmartPlant Foundation **To Do List** for correction.

Return the status of a project to Active

You can return the status of a project from **Complete** to **Active** only when one of the following conditions applies:

- The selected project is not registered.
 - The selected project status is **Completed**, but the SmartPlant project status is still **Active**.
1. In the **Project Management** task, select a model in the Project Management tree.
 2. Click **Tools > Update Project Status**.
 3. In the **Update Project Status** dialog box, select the project in the **Project Name** list whose status you want to return to **Active**.
 4. Click **Return to Active**.
 5. After the project status is modified and published, click **Close**.

NOTES

- When you click **Return to Active**, the software queries the SmartPlant status before modifying the status of the selected project. If the project is registered and the SmartPlant project status is **Completed**, the software displays a message informing you that you cannot return the project status to active.
- After the project status is set to **Active**, you can update the model with further changes, and you can regenerate drawings. When the project is ready to complete, follow the steps outlined in *Project Status Update* (on page 31).

Cancel a project

When the project administrator determines that a project needs to be canceled, the Project Completion Workflow starts, resulting in a Cancel Project task being displayed in the SmartPlant Foundation **To Do List**.

1. Select a model in the Project Management tree view.
2. Click **Tools > Update Project Status**.
3. In the **Update Project Status** dialog box, select the name of the project that you want to cancel.
4. Click **Cancel Project**.
5. When processing completes, click **Close**.

NOTES

- After the project status is cancelled, you must approve the Cancel Project step in the SmartPlant Foundation **To Do List**.

- In the Project Management environment, canceling a project releases all claims.

See Also

Update Project Status Dialog Box (on page 30)

Upgrade Schema Command

Updates the existing tool map schemas associated with the active site to a newer version. This command is primarily used when you are upgrading between major software versions. For more information about the upgrade of Smart 3D, see the *Smart 3D Upgrade Guide*.

The tool map schema files are normally write-protected as delivered. Before you execute the command, ensure that these files in the symbols\xml folder and in the DesignBasisSchemas subfolder and all associated files are writable.

Backups are made of all files that are processed. To access the command, click **SmartPlant > Upgrade Schema**. **Upgrade Schema** can take several minutes to complete processing.

The following SharedContent file shares are processed:

- *SP3DPublishMap.xml* - Upgraded to Version 2016 (11.0).
- *P3DComponent.xml* - Upgraded to Version 2016 (11.0).
- *DesignBasis_Map.xml* - Copied to the SharedContent folder.

Upgrade Schema

1. In Project Management, click a model database in the tree view.
2. Click **SmartPlant > Upgrade Schema**.

Schema Mapping

When the schema is extended, such as when new classes, properties, or select list entries are added, you or an administrator must react to the change by updating the mapping in Smart 3D. Mapping is used during the publish and retrieve operations, as well as when correlating design basis objects with model objects.

The Catalog Schema database in Smart 3D must also be updated when extending the schema, if the new information does not already exist in the database.

NOTES

- New Smart 3D-to-SmartPlant Foundation property mappings are available, but they are disabled by default. You must have SmartPlant Foundation version 4.4 or later to enable the new mapping using the Schema Editor. For more information, see *Disable or Enable an Existing Property Relationship in the Schema* in the *Schema Editor User's Guide*.
- For assistance with mapping, connect to the Intergraph Support page at <http://support.intergraph.com>, and file a service request.

See Also

Generate a design basis (on page 27)

Schema Mapping Rules

This section describes the assumptions, rules, and limitations imposed by the Smart 3D adapters on schema mapping.

Before modifying the mapping for Smart 3D, you must understand the following:

- The Smart 3D software
- The Smart 3D data model
- The delivered mapping for Smart 3D
- How the delivered mapping for Smart 3D works

See Also

Mapping Rules and Limitations (on page 41)

General Information about Schema Mapping (on page 36)

General Information about Schema Mapping

This topic provides general information about the mapping in Smart 3D. Mapping ensures a meaningful transfer of data between Smart 3D and the rest of the integrated environment.

For more information about mapping, see the *SmartPlant Schema Editor User's Guide* and the *SmartPlant Mapping User's Guide*, available in the SmartPlant Foundation documentation. You can also find more information about mapping in the documentation for each authoring tool.

Adapters

Each authoring tool has an adapter that processes information during the publish and retrieve operations. One of the functions of the adapter is to map information between the particular authoring tool and the SmartPlant schema.

Smart 3D currently has the following adapters:

- Publish Adapter
- Retrieve Adapter
- Metadata Adapter

The publish adapter uses a tool schema file (generated from the Smart 3D Catalog Schema and supplemented with mapping information) and a schema called the P3DComponent schema, which is derived from the SmartPlant schema.

The retrieve adapter for Smart 3D requires that each document type have a registry entry present. These registry entries define the map file used and define callback objects that perform additional processing. It is possible that each document type could have its own map file.

The retrieve adapter uses a map file, which is defined by tool schema files.

The metadata adapter simplifies the process of mapping when you are using the Schema Editor, which is delivered with the SmartPlant Foundation software. This adapter synchronizes the tool map schema with the tool metadata. In Smart 3D, tool metadata is the data in the Catalog Schema database. When you are in the Schema Editor, the Smart 3D metadata is saved when you save the tool schema file (**File > Save > Tool Schema File**). For more information, see the *Schema Editor User's Guide*, delivered with SmartPlant Foundation.

Tool Map Schemas (Map Files)

For publish, two map files exist: SP3DPublishMap.xml and Dwgs3dmap.xml.

SP3DPublishMap.xml is used for generating the XML data for 3D model data. Dwgs3dmap.xml is used for publishing drawing documents (isometric drawings, orthographic drawings, reports, and Smart 3D model data).

For retrieve, the map file is DesignBasis_map.xml.

The map file for correlating design basis objects with Smart 3D objects is SP3DPublishMap.xml. For more information about correlating in general, see the *Common User's Guide*, available from **Help > Printable Guides**.

The following lists the map files delivered and their use for mapping.

- DesignBasis_map.xml - This file is used during the retrieval of the design basis. It contains mapping relations between SmartPlant objects (classes and interfaces) and the design basis objects (classes and interfaces). This file is generated/updated by running the **GenerateDesignBasis** command in the Smart 3D Project Management. You MUST use this command to update DesignBasis.xml so that the SCEF Package schema in the Smart 3D catalog is synchronized with this .xml file.
- P3DComponent.xml and SP3DPublishMap.xml - These files are used to generate XML data for 3D model data during the publishing process. The SP3DPublishMap.xml contains the Smart 3D schema and the mapping relations between Smart 3D objects, such as classes and interfaces (properties, codelists, and relationships), and the 3D SmartPlant objects. The P3DComponent.xml contains the 3D SmartPlant schema of the data that can be published to the SmartPlant Foundation data warehouse.
- ExemptCorrelateClasses.xml - This xml file is used to add conditions that cause the correlation basis of an object to be set to 'Ignored' when that object meets the conditions.

The map files are delivered to the SharedContent share folder that is associated with the catalog for the site.

How Mapping is Configured for Publish

If you are working in full integration mode, you can configure the publish mapping in the Schema Editor. You can add new interfaces, properties, select lists, and select list values, and the Schema Editor changes the tool map schema (SP3DPublishMap.xml) and updates the Catalog Schema database accordingly. For more information about the Schema Editor, see the *SmartPlant Schema Editor User's Guide*, available with SmartPlant Foundation.

If you are working with a model that is not registered (such as when you view your 3D model data in SmartPlant Review outside of an integrated environment), you can still edit the tool map schema in the Schema Editor, but you cannot modify the Catalog Schema database directly from the Schema Editor. Instead, you have to add the objects to the database using internal development utilities. The net result of the process is that the tool map schema and the Catalog Schema database include the applicable mapping information. For more information about the publish map process, see *Maintaining Tool Map Schemas* (on page 39).

During a publish operation, the tool map schema (with added mapping information) and the P3DComponent component schema (derived from the SmartPlant schema) are used to convert Smart 3D objects to SmartPlant integration objects.

How Mapping is Configured for Retrieve

You use the Generate Design Basis tool provided by the Smart 3D software to do the mapping for retrieve. Modification to the map file is automatic and does not require manual editing. The Generate Design Basis tool creates the mapping based on a set of component schemas: EFSchema (also known as SmartPlant schema), PIDComponentSchema, WBSCOMPONENTSchema, and so forth. The tool output is a Smart 3D schema package, which is loaded into the Smart 3D Catalog Schema database, and the retrieve map file. For more information about the retrieve map process, see *Maintaining Tool Map Schemas* (on page 39).

During a retrieve operation, the map file is used to translate the incoming data into the form defined in the Catalog. For example, attributes in a document are typically passed as strings. The corresponding attribute in Smart 3D could be a string, a long, a double, a select list, or another type. The map file could translate a string such as "TRUE" to the Boolean value True in Smart 3D.

Design Basis Mapping

In the design basis map file, the mapping is not always one-to-one. You can use helper software to assist in mapping. For example, in the SmartPlant schema, NPD is a single property. A helper splits the NPD property into the two properties required by Smart 3D. The helper is designated in the <ConvertPROGID> line in the map file .xml code.

Mapping Enumerated Lists

To use an enumerated list (also called codelist or select list) in an integrated environment that includes Smart 3D, you must map the list in the SmartPlant schema in order for the codelist values to be published or correlated. If the list does not already exist in the SmartPlant schema, then it has to be created there and mapped. If it already exists in the SmartPlant schema, then you must define the mapping between the SmartPlant schema and the tool map schema.

In most cases, enumerated lists in Smart 3D are not mapped in the Schema Editor. These lists use the index number defined in the enumerated definition to map from the tool to the SmartPlant schema. You must ensure that the **Number** for the enumerated list entry in the SmartPlant Schema matches the codelist numerical value in the 3D catalog. When these values match, list values for mapped properties that use the lists are automatically mapped based on those numbers. When necessary, you may override that default mapping by manually creating a publish relationship between a Smart 3D codelist and an enumerated list entry in the SmartPlant schema.

NOTE If the Number for the enumerated list entry in the SmartPlant Schema does not match the codelist numerical value in the 3D catalog, then you must use the Schema Editor to explicitly map the entries between the SmartPlant Schema and the Smart 3D catalog.

For example, if you want to add Fluid System values, modify the SmartPlant schema to include the fluid codes that are missing. You can examine the catalog data in the **Catalog** task or in the Excel .xls files that were bulk loaded to find out which fluid codes to add and their numbers. You must also regenerate the component schemas to create a new P3DComponent.xml file, which is part of the SmartPlant schema. For more information, see *Example: Mapping for Retrieve* (on page 51).

For publishing operations and correlation, make the corresponding changes and additions in the publish map file. This process is automated using the metadata adapter within the Schema Editor.

★IMPORTANT User reference data codes start at 10,000. Values less than 10,000 are reserved for use by Intergraph. For example, if you are extending an existing list, such as Fluid System, then any new list entries must be greater than 10,000, less than 40,000 and unique in that list. However, if you are creating a completely new list, the numbers for the entries can be anything (no range limit) so long as they are unique in the list.

To map custom enumerated list data type properties at the document level, you cannot use the metadata adapter. You must perform the following using the Schema Editor:

1. Create an SPMAPPropertyDef in the Dwgs3DMap.xml file that corresponds to the Smart 3D custom property.
2. Create an SPMAPEnumListDef in the Dwgs3DMap.xml file that corresponds to the Smart 3D custom codelist table.
3. Make the new SPMAPPropertyDef scoped by the new SPMAPEnumListDef.
4. Map the new SPMAPPropertyDef and SPMAPEnumListDef to the corresponding PropertyDef and EnumListDef in EFSchema.

Other Information about Mapping

You might wonder how the software knows which object corresponds to a property. During a retrieve operation, each object is identified by its UID. A one-to-one relationship exists between an object and its UID. After the object is identified and brought into memory, the mapped properties are stored.

You might also wonder if you can map attributes on the document object itself. This mapping is possible as long as the attributes are defined in both the SmartPlant schema and the Smart 3D Catalog Schema. Typically, a document object implements the IDocument interface in addition to other special purpose interfaces.

See Also

Schema Mapping Rules (on page 36)

Maintaining Tool Map Schemas

This section provides the workflows for maintaining the publish and retrieve tool map schema files in Smart 3D. These workflows are used when changes are made to the schema during customization.

NOTES

- If you are working in full integration mode, you can modify the publish map schema and Catalog Schema database using the Schema Editor, rather than following the procedure below.
- Changing the publish mapping according to the procedure below requires internal development software. For more information, please contact Intergraph Support.

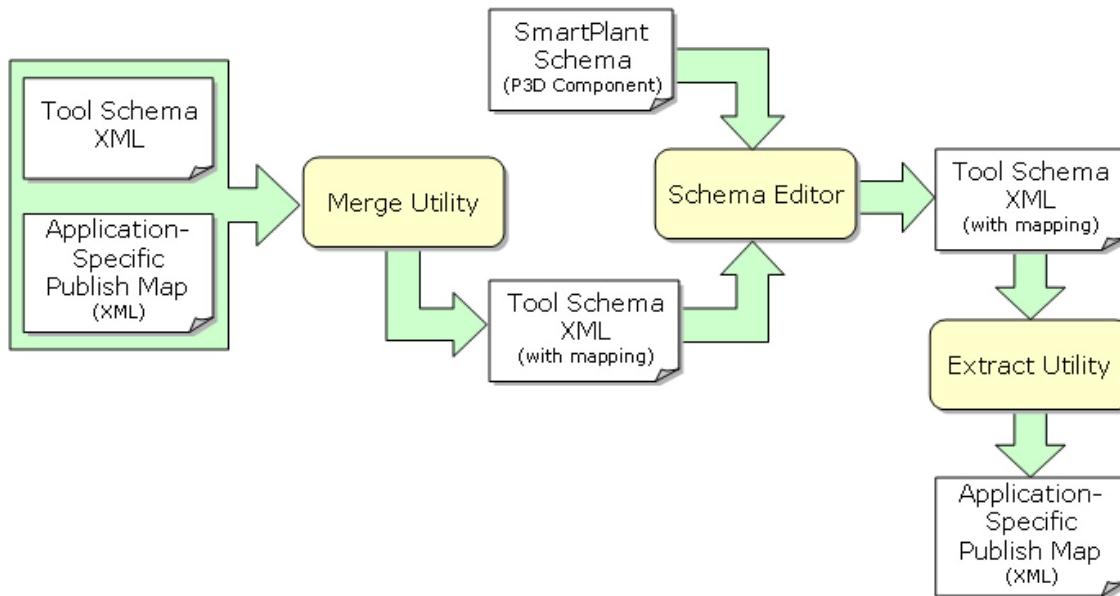
Publish

1. Use the Tool Export utility to create a tool schema.

†TIP Instead of creating a new tool schema, you can use the delivered tool schema, which is named SP3DToolSchemaTEF.xml.

2. Add application-specific mapping information to the tool schema. You can do this process using a Merge utility, the Schema Editor, and an Extract utility.

The following picture shows the workflow for maintaining the publish map file.



During a publish operation, the tool schema (with added mapping information) and the P3DComponent.xml schema are used to convert Smart 3D objects to SmartPlant objects.

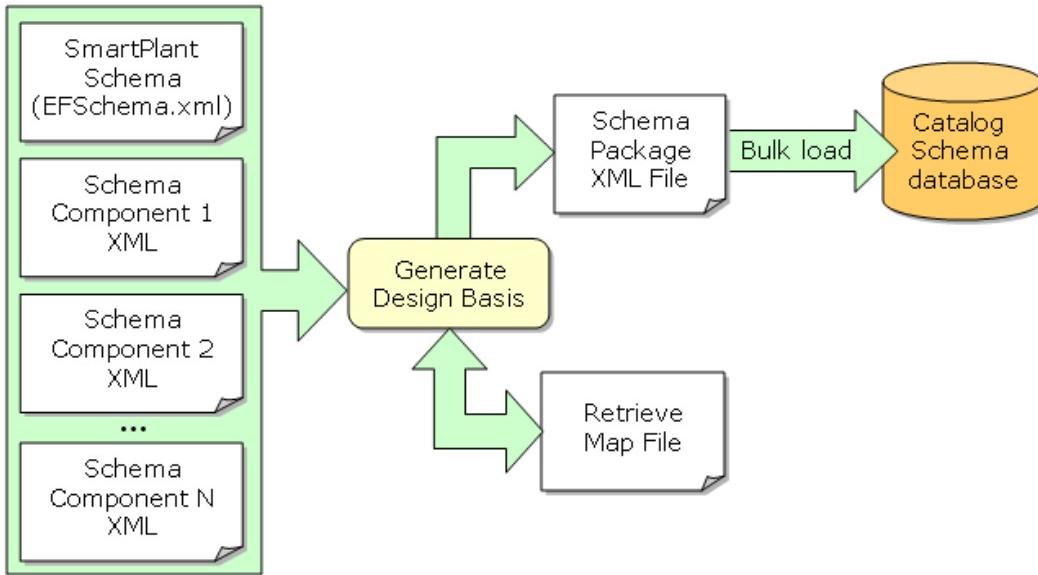
Retrieve

Use the Generate Design Basis utility to create a Smart 3D schema package and an updated retrieve map file.

NOTES

- During the Generate Design Basis process, the utility loads the schema package into the Smart 3D Catalog Schema (metadata database).
- The retrieve map file is placed in the Smart 3D SharedContent\xml location.

The following picture shows the workflow for maintaining the retrieve map file.



During a retrieve operation, the map file is used to translate the data into the form defined in the Catalog.

See Also

[Schema Mapping Rules \(on page 36\)](#)

Mapping Rules and Limitations

Schema mapping in Smart 3D has some important limitations that you need to know.

Per Model Limitation

Smart 3D does not support mapping per model, just per catalog. SmartPlant Foundation does support mapping per model. If you want to map per model in Smart 3D, set up your project so that you have one catalog per model.

Publish Limitations

Mapping for publish carries the following limitations:

- The mapping is done against the P3D Component only.
- The Schema Editor does not currently show the properties for mapped edge definitions. Any mapping spreadsheet generated using the Schema Editor will not have all of the mappings.
- Some properties are set in the publish code and cannot be changed. The following table lists these properties.

Tool Class/Map Edge	Tool Property	SmartPlant ClassDef/EdgeDef	SmartPlant PropertyDef
IJDObject	OID	P3DEquipment	UID
IJNamedItem	Name	P3DEquipment	Name

Tool Class/Map Edge	Tool Property	SmartPlant ClassDef/EdgeDef	SmartPlant PropertyDef
IJRange	Low_x	P3DEquipment	Range1X
	Low_y	P3DEquipment	Range1Y
	Low_z	P3DEquipment	Range1Z
	High_x	P3DEquipment	Range2X
	High_y	P3DEquipment	Range2Y
	High_z	P3DEquipment	Range2Z

When you use the Schema Editor to update the publish mapping and Catalog Schema, the following limitations exist:

- It is not possible to create a new MapClassDef (tool map object for a class in Smart 3D) using the Schema Editor. However, you can create new user-defined classes with the Excel workbooks and the Bulkload utility. These new classes are then added to the tool map schema (SP3DPublishMap.xml) during the synchronize step in the Schema Editor.
- Adding or deleting properties on a system interface is not permitted. Only properties in the user-defined package can be modified.
- Modifications to certain system select lists are not allowed. You can open the **AllCodeLists.xls** workbook delivered with Smart 3D to determine what select lists can be modified. There is a note at the top of each sheet telling you if the list can be modified, and if so, what parts of the list can be modified. Alternatively, you can open and review the **AllNonEditableSystemCodeListTables.txt** file delivered to **[Product Folder]\CatalogData\BulkLoad\Bin**. This file lists the codelists that are not editable.
- Creating a new MapUoMDef in the tool map schema does not create a new UnitType in Smart 3D.

Retrieve Limitations

During a retrieve operation, the adapter assumes that the data it receives is synchronized with the metadata defined in the Catalog Schema. The map file cannot have a one-sided definition. That is, a class or property must exist both in the SmartPlant schema and in the Smart 3D Catalog Schema. The map file is responsible for making this connection between the two definitions.

An important limitation of the retrieve process is that shared objects (objects that contain information from two or more tools) are completely deleted when a single tool deletes an object.

Select List (Enumerated List) Limitations

There are different kinds of select lists; one type is system lists. Most system select lists are not extensible. You can view explanations of the restrictions in the **AllCodeLists.xls** workbook.

Another type of select list is a hierarchical (multi-level) list. You can have duplicated values in another level within a hierarchical list. However, you cannot have duplicated values at the same level in a hierarchical list, or in a list with just one level.

User reference data codes start at 10,000. Values less than 10,000 are reserved for use by Intergraph. When you extend a select list, you should start with values greater than or equal to 10,000.

Limitation on the SmartPlant Schema

The retrieve map is updated directly from the contents defined in the SmartPlant schema. In rare cases, if an entry is removed from the SmartPlant schema, you may need to edit the retrieve map file to remove the deleted entry. You should use the Schema Editor delivered with the Schema Component for this purpose.

See Also

Schema Mapping Rules (on page 36)

Select and Process Criteria for Publish and Retrieve Mapping

As you customize the publish and retrieve mapping in Smart 3D, you might encounter select and process criteria. Process criteria, also known as "callbacks," assist during publish and retrieve operations when the information in the tool schema does not match the information in the SmartPlant schema. Select criteria, when used, are the arguments for the Process Criteria programs.

NOTE Smart 3D supports both VB6, C++, and .NET callbacks with one exception: .NET unmapped property callbacks.

Publish Tool Map Schema

The publish tool map schema includes select and process criteria on map class definitions and property definitions.

Map Class Definitions

Process Criteria (ProgID)	Select Criteria	Class	Task	Description
EFPublishHelpers.PUBLISHImpliedPartOcc	CImpliedPartOcc	CImpliedPartOcc	Common	Helps with publishing implied part occurrences: whether to publish them or not and whether to map the objects. When a part occurrence is published, its implied part should also be published if the part occurrence is a piping component.
EquipPublishHelpers.I_ntfPublishHelper	CPCableNozzle CPCableTrayNozzle CPConduitNozzle CPEqpFoundationPort CPHvacNozzle CPPipeNozzle	CPCableNozzle CPCableTrayNozzle CPConduitNozzle CPEqpFoundationPort CPHvacNozzle CPPipeNozzle	Equipment	Helps with publishing equipment. This code publishes nozzles only if they are connected to an equipment or a component.

Process Criteria (ProgID)	Select Criteria	Class	Task	Description
RtePublishHelpers.RelationHelper	N/A	CPPipeAlongLegPathFeat CPPipeEndPathFeat CPPipeTurnPathFeat	Route	<p>Helps with publishing relations associated with piping objects. For example, this code helps decide which SameAs relation to publish, when there is more than one possible SameAs relation allowed by the SmartPlant schema.</p> <p>NOTE In this case, the callbacks are on the relation mapping, not on the class mapping.</p> <p>Here are the callbacks for the relations associated with the classes:</p> <ul style="list-style-type: none"> OwnsDistributionConnection: When an occurrence of the relation OwnsDistributionConnection is to be published, if the owner is a LogicalDistribConn (LDC), then the PathRun parent of the LDC is retrieved and returned as the owner. RelConnectionAndPartOcc: When an occurrence of the relation OwnsDistributionConnection is encountered, this callback checks to see if the connection object should be published. PathGeneratedParts: If a feature supports correlation, then the PathGeneratedParts relation between it and its base part is published as a SameAs. SameAs: Determines if the SameAs relation on a feature is of type Instrument or Pipe Component.

Map Property Definitions

Process Criteria (ProgID)	Select Criteria	Property	Task	Description
EFPublishHelpers.LocaICSHlpr	N/A	Position XAxis YAxis ZAxis	Common	Provides special processing for local coordinate system properties during a publish operation.

Process Criteria (ProgID)	Select Criteria	Property	Task	Description
EquipPublishHelpers.PropPublishHelper	N/A	DistribPortStatus DistribPortType EndStandard FlowDirection Ncd NcdUnitType Npd NpdUnitType PressureRating ScheduleThickness Tightness	Equipment	Helps with publishing various equipment properties, for example, properties on different types of nozzles.
EquipPublishHelpers.PropPublishHelper	EquipmentComponent	ProcessEqCompTypes1 ProcessEqCompTypes2 ProcessEqCompTypes3 ProcessEqCompTypes4	Equipment	Helps with publishing properties on equipment components. For a list of the delivered equipment component types, see the AllCodeLists.xls workbook.
EquipPublishHelpers.PropPublishHelper	Equipment	ProcessEqTypes0 ProcessEqTypes1 ProcessEqTypes2 ProcessEqTypes3 ProcessEqTypes4 ProcessEqTypes5 ProcessEqTypes6	Equipment	Helps with publishing properties on equipment. For a list of the delivered equipment types, see the AllCodeLists.xls workbook.
RtePublishHelpers.PartPublishHelper	N/A	CommodityClass CommoditySubClass CommodityType	Route	Helps with publishing Route parts. These instrument properties are not published because the SmartPlant schema does not contain corresponding properties.

Process Criteria (ProgID)	Select Criteria	Property	Task	Description
RtePublishHelpers.Pro pPublishHelper	N/A	NCD NPD OuterDiameter SteamoutPressure SteamoutRequirement SteamoutTemperature Thickness	Route	<p>Helps with publishing properties on Route parts.</p> <p>NPD and NCD: In Smart 3D, the value and units for these properties are stored as two separate properties. In the SmartPlant schema, they are stored as one property. This helper concatenates the value and its UOM so that it can be published as one property.</p> <p>OuterDiameter: This property is not published for components because the model does not have data for this case.</p> <p>Steamout properties: These properties are not published for conduit.</p> <p>Thickness: The software publishes this value only if the value is greater than 0.</p>
SP3DEFPropHelper.Sy stemPathPublisher	N/A	SystemPath	Common	Helps with publishing the SystemPath property on an object in the model. This code parses the select criteria to get the delimiter for constructing the system hierarchy path. The software uses the \ delimiter if none is specified.
SPSProcessTEFProp. MatGradeProp	N/A	MaterialGrade	Structure	Provides custom process criteria for the MaterialGrade property. The code converts the property string to a codelist value.
SPSProcessTEFProp. PartAxisProp	N/A	BetaAngle Mirror	Structure	Provides custom process criteria for the mirror and beta angle properties in the SmartPlant schema. These properties are not published on the member system.
SystemPublishHelper. PropPublishHelper	N/A	FluidCode FluidSystem	Systems & Specs	<p>Provides special processing for the FluidCode and FluidSystem properties, which are properties on pipeline systems. The SystemPublishHelper.PropPublis hHelper class is similar to the EquipPublishHelpers.PropPublish Helper class.</p> <p>The code handles codelist values that use 1 as "Undefined". The SmartPlant schema supports -1 as "Undefined", so the values are converted to -1.</p>

Retrieve Tool Map Schema

The retrieve tool map schema includes callbacks for document types, as well as a few other callbacks.

Document Type	ProgID	Task	Description
ProjectBrkDwn	EFWDocCallback.WBSCallback	Common	<p>Processes WBS (Work Breakdown Structure) projects and items when the software retrieves project breakdown structure documents.</p> <p>This class determines whether to correlate the WBS projects and items with 3D objects.</p>
PBSDocument	EFSysCallback.EFUnitSysCallback	Systems & Specs	<p>Processes area systems and unit systems when the software retrieves PBS (Plant Breakdown Structure) documents created by SmartPlant Foundation. When an area or unit system is retrieved, the software checks to see if there is an existing Smart 3D object with the same name and type in the same location in the system hierarchy. If so, the software correlates to this object instead of creating a new object.</p>
PIDDrawing	EFSysCallback.EFPipelineCallback	Systems & Specs	<p>Processes pipeline systems when the software retrieves P&ID documents created by SmartPlant P&ID. When a pipeline is retrieved, the software checks to see if there is an existing pipeline with the same name in the same location in the system hierarchy. If so, the software correlates to this pipeline instead of creating a new pipeline.</p>
N/A	CmnAppPropHelpers.WBSProjMapHelper	Common	<p>Compares the project name of the Smart 3D object with the project name of the corresponding design basis object during the Compare Design Basis command.</p>
N/A	EquipPropConversion.InsulateConversion	Equipment & Furnishings	<p>Provides property conversion for equipment insulation during the Compare Design Basis command.</p>
N/A	RteMapPropHelpers.RunMapPropHelper	Route	<p>Facilitates the mapping of data in the SmartPlant schema to Smart 3D pipe runs (for example, flow direction and slope) during the Compare Design Basis command.</p>

See Also

[Schema Mapping Rules \(on page 36\)](#)

Select and Process Criteria - Marine 3D

Smart 3D Marine mode delivers process criteria in addition to those delivered with Smart 3D Plant mode.

NOTE Currently, there are no select criteria used for the Smart 3D Marine mode classes or properties.

Publish Tool Map Schema

The publish tool map schema includes process criteria on map class definitions and property definitions.

Map Class Definitions

Process Criteria (ProgID)	Class	Task	Description
ShipPublishHelpers.ClassPublishHelper	CBeamSystem CEdgeReinforcementSystem CPlateSystem CProfileSystem	Molded Forms	Helps with mapping Smart 3D Marine mode classes to SmartPlant schema classes during publishing. The mapping is done based on the class properties and behavior. Root systems are published as root systems in the SmartPlant schema. These systems are placeholders with only their oid and name. Leaf systems are the systems that actually contain information.
ShipPublishHelpers.PartClassesPublishHpr	CBeamPart CCollarPart CEdgeReinforcementProfilePart CPlatePart CProfilePart CSmartPlate CStandAlonePlatePart CStandAloneStifferPart CStiffenerPart	Molded Forms Structural Detailing (CCollarPart, CSmartPlate, CStandAlonePlatePart, CStandAloneStifferPart)	Manages the publishing of parts so that only eligible (leaf) parts are published. NOTE The RootPartRelation class in the ShipPublishHelpers project assists in the publishing of straked (split) parts. The reason for having these process criteria is to support the following situation: In Smart 3D Marine mode, a plate part, a profile part, or an edge reinforcement part can be straked (split) into leaf parts, creating a hierarchy of parts. Only the leaf parts need to be published. The

Process Criteria (ProgID)	Class	Task	Description
			PartClassPublishHelper class prevents the root part from being published. The RootPartRelation class re-assigns the leaf part to the leaf system in the SmartPlant schema, skipping over the non-published root part.

Map Property Definitions

Process Criteria (ProgID)	Property	Task	Description
ShipPublishHelpers.CurvedPlate	Curved	Molded Forms	Provides special processing for publishing of the curvature property on plate parts. In Smart 3D Marine mode, this property is one property; in the SmartPlant schema, it is two properties.
ShipPublishHelpers.CurvedProfile	Curved	Molded Forms	Provides special processing for publishing of the curvature property on profile parts. In Smart 3D Marine mode, this property is one property; in the SmartPlant schema, it is two properties.
ShipPublishHelpers.ProfileProp	EstimatedSurfaceArea Length	Molded Forms	Facilitates the mapping of properties on profile classes in Smart 3D Marine mode to the SmartPlant schema.
ShipPublishHelpers.PropPublishHelper	Length NamingCategory PlateThickness SurfaceArea Tightness	Molded Forms	Facilitates the mapping of properties in Smart 3D Marine mode to the SmartPlant schema.

See Also

[Schema Mapping Rules \(on page 36\)](#)

Create a Custom PBS Hierarchy

Before starting this procedure, you must create the custom hierarchy in the SmartPlant schema using the Schema Editor. For more information, see *Work Process for Creating a Custom PBS* in the *SmartPlant Schema Editor User's Guide*.

Back up Schema and Design Basis Files

- Make copies of the design basis map files on the Smart 3D reference data server. The location and file names are [*Product Folder*]\\SharedContent\\Xml\\DesignBasis.xml and DesignBasis_Map.xml.
- Ensure you have write permission to the files in the \\Symbols\\xml folder.

Generate New Schema Component Files

The custom PBS you created in Schema Editor must be checked into SmartPlant Foundation Desktop client before you can generate new component files.

1. In SmartPlant Foundation Desktop Client, click **Find > Integration > Schema Documents**, and then right-click the CMF file.
2. On the shortcut menu, click **Regenerate Schema Files**.
NOTE This command creates a scheduler task that regenerates the component schema files based on the information in the current version of the CMF.
3. Verify the **Published File Scheduler** is started so that the component schema files can be generated.

This command generates the SmartPlant component schemas in the location defined for your site in Server Manager.

NOTE This process can run in the background while you proceed with other operations; however, it must be completed before you attempt to publish or retrieve from an authoring tool.

Generate New Design Basis Files

1. Open the **Project Management** task.
2. Right-click the Catalog Database under Reference Data in which the custom hierarchy will exist, and select **Generate Design Basis**.
3. On the **Select Component Schemas Path** dialog box, browse to the folder for component schemas generated by SmartPlant Foundation.
4. When the generation completes, click **OK**, then click **Close**.

Regenerate Views and Reports Database

1. In Project Management, select **Tools > Synchronize Model with Catalog**.
2. Remove the check next to **Synchronize model with catalog**, and then click **OK**.
3. Right-click the model, and select **Regenerate Reports Database**.

After you have completed the steps above, retrieve the PBS document in Smart 3D. The custom hierarchy will be under the Generic System on the **System** tab in the **Workspace Explorer**.

Smart 3D Mapping Examples

The following publish and retrieve mapping examples describe mapping for Smart 3D.

Example: Mapping for Retrieve (on page 51)

Example: Mapping for Publish (on page 69)

These examples illustrate how to create mapping relationships to properties that have already been created in the SmartPlant Schema for mapping with other authoring tools. For more example about creating these custom properties, enumerated lists, and enumerated list items in the SmartPlant Schema, see *Authoring Tool Mapping Examples* in the *SmartPlant Mapping User's Guide*.

Example: Mapping for Retrieve

This example describes how to extend two existing enumerated lists (also called codelists or select lists) and an existing property definition, and how to update the retrieve mapping for Smart 3D.

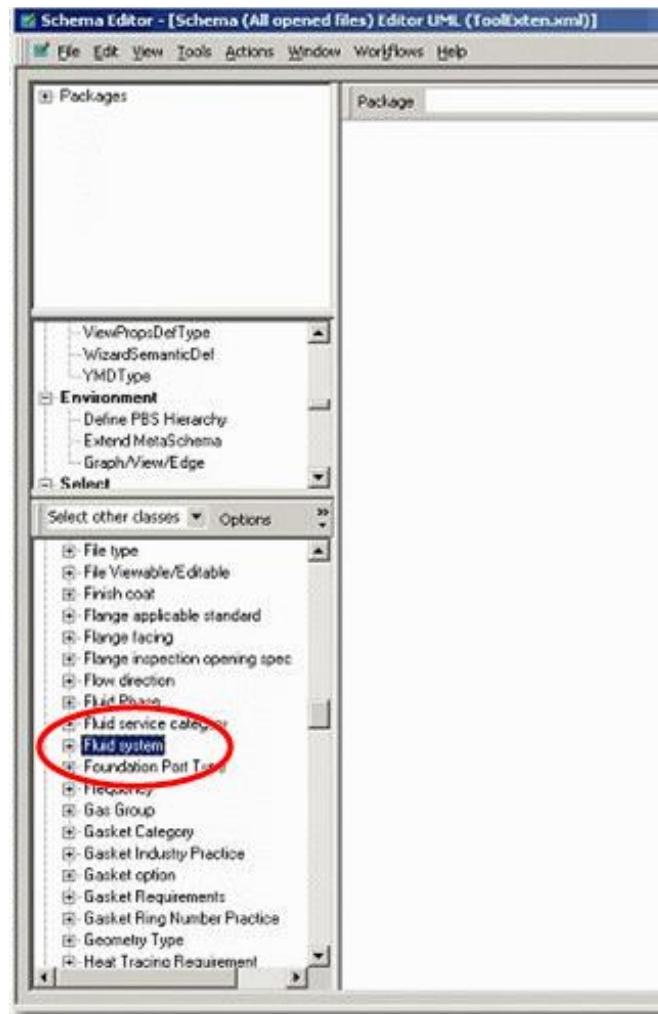
The following is an overview of the steps in this example.

1. Verify the enumerated lists and the property definitions in the SmartPlant schema.
 - Enumerated Lists: **Fluid system**, **EngSys**
 - Property Definitions: **SystemCode**, **EngineeringSys**
2. Regenerate component schemas.
3. Add the new information to the Smart 3D Catalog.
4. Generate the design basis, and regenerate views and the Reports database.
5. Check the properties in Smart 3D.

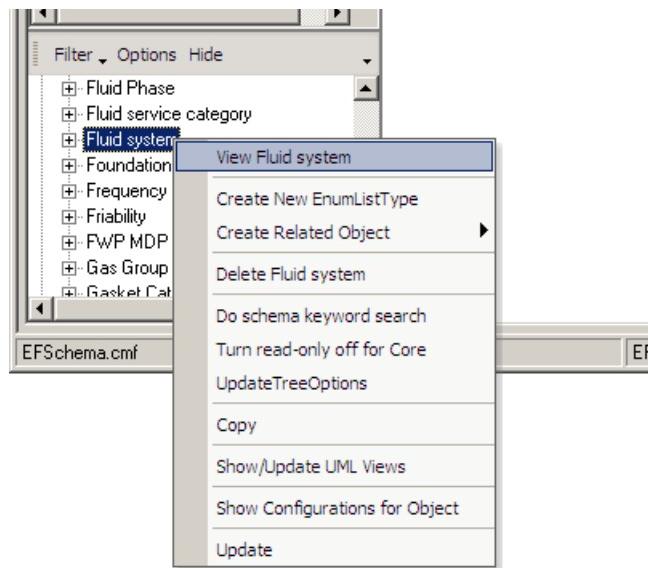
Verify Information in the SmartPlant Schema

1. In the Desktop Client, set your scope for the applicable plant, and then find the CMF file.
2. Right-click the CMF file, and select **Launch Schema Editor**.
3. On the **Set Active Configuration** dialog box, select the version of the schema that you want to view.
4. Click **OK** to set the configuration, and open the Schema Editor.
5. In the Schema Editor, click **Workflows > Overall Workflows**.
6. Beside the **Another Schema File** button, click **View**, and then open the schema in one of the editors. In this example, choose **Editor**.

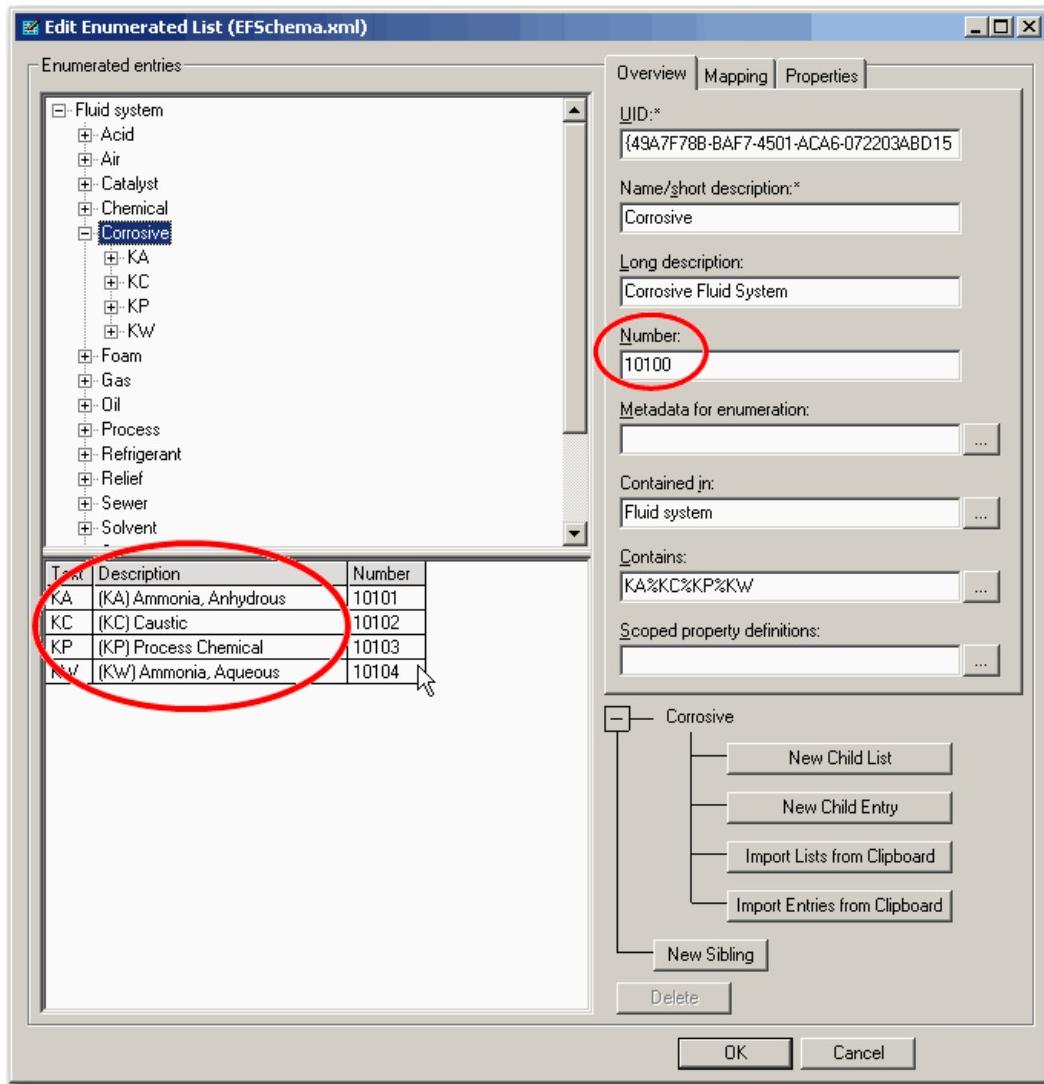
7. Expand **EnumListType**, and find the **Fluid system** node.



8. Right-click **Fluid system**, and select **View Fluid system** on the shortcut menu.



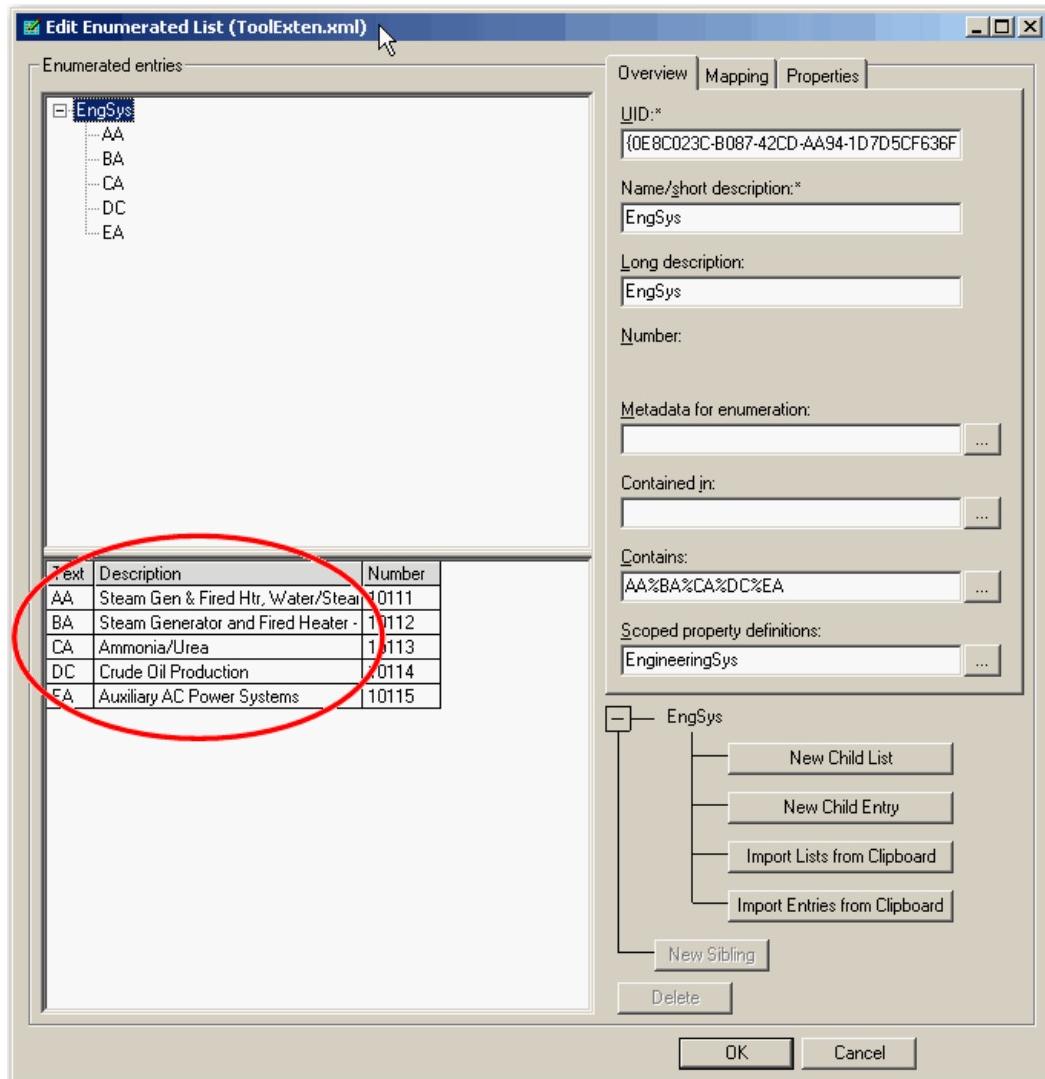
9. Expand the **Corrosive** node, and verify the four fluid codes.



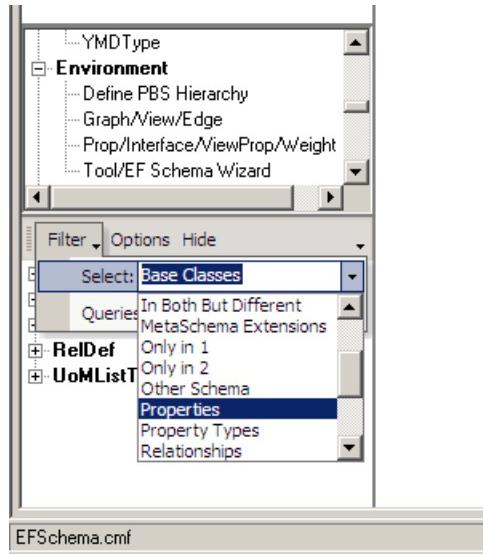
★IMPORTANT For Smart 3D retrieve mapping, the **Name** and **Long description** provided here for the enumerate list values do not matter. You can explicitly map codelist values for Compare with Design Basis, which allows codelist values not to match to the SmartPlant schema number for the value to be retrieved.

Short Description	Long Description	Number
KA	(KA) Ammonia, Anhydrous	10101
KC	(KC) Caustic	10102
KP	(KP) Process Chemical	10103
KW	(KW) Ammonia, Aqueous	10104

10. Click **Cancel** to close the **Edit Enumerated List** dialog box.
11. In the tree view, expand **EnumListType**.
12. Right-click **EngSys**, and select **Edit EngSys** on the shortcut menu.
13. Verify the properties for the **EngSys** enumerated list, and then click **Cancel**.

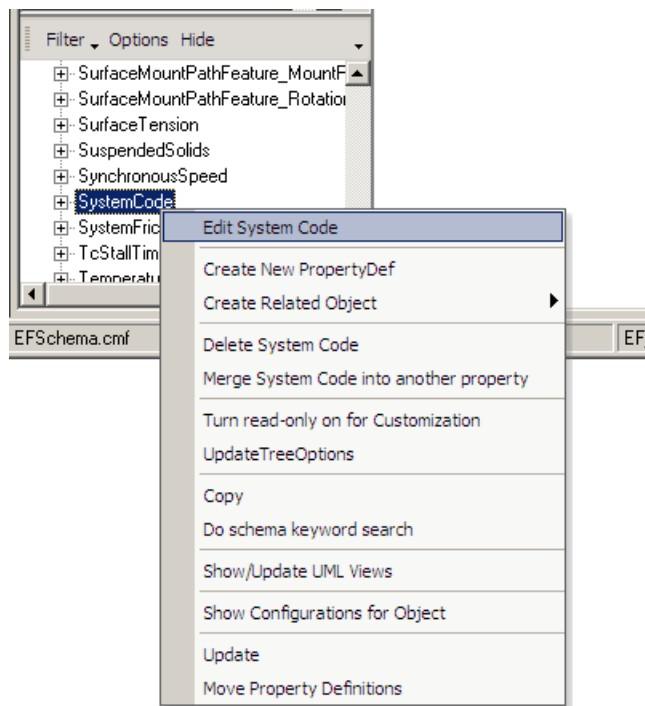


14. Click **Filter** in the tree view, and select **Properties** from the **Select** list.

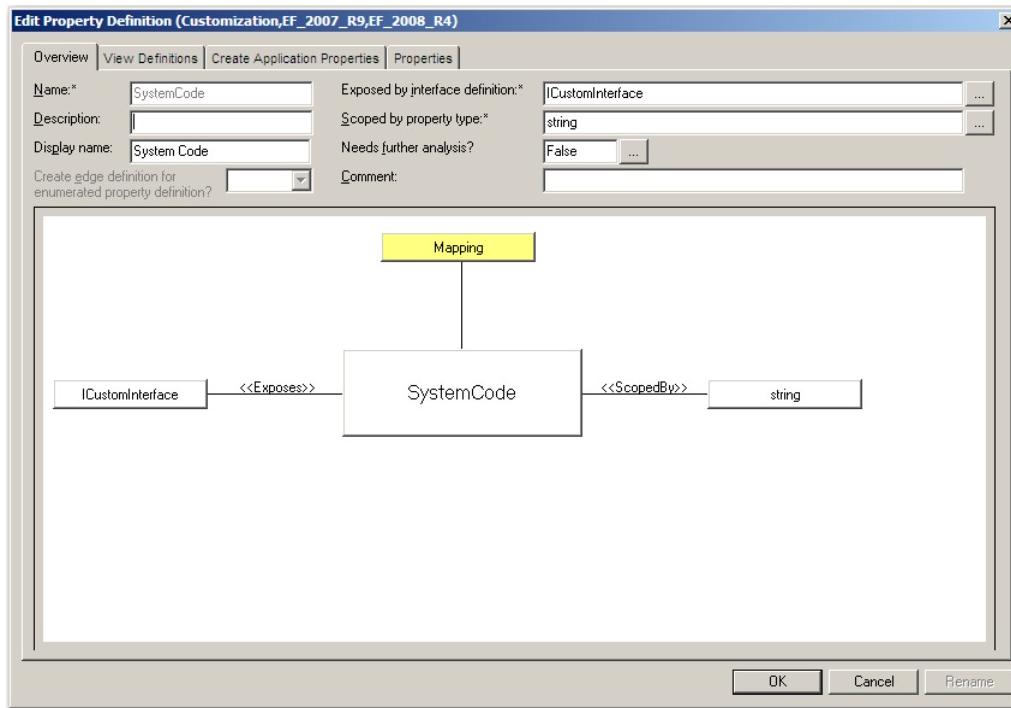


15. In the tree view, expand the **Property Def** list.

16. Right-click **SystemCode**, and select **Edit System Code** on the shortcut menu.



17. Verify the attributes of the system code property, and then click **Cancel**.



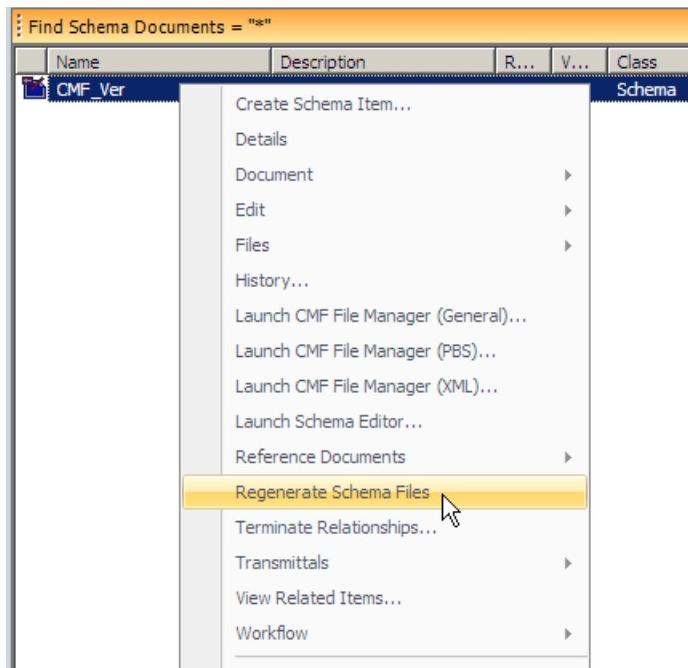
18. In the tree view, find the **EngineeringSys** property.
19. Right-click **EngineeringSys**, and select **Edit Engineering System property** on the shortcut menu.
20. Verify the attributes of the engineering system property, such as that it is scoped by the enumerated list **EngSys**, and then click **Cancel**.
21. Click **File > Close** to close the Schema Editor.

Regenerate the Component Schemas

The component schemas of other authoring tools are used to create the retrieve map file for Smart 3D. To ensure that the new properties and enumerated lists are included in the appropriate component schema or schemas, regenerate the component schemas from the SmartPlant Foundation Desktop Client.

1. In the Desktop Client, click **Find > Integration > Schema Documents**.
2. Click OK to find all schema documents.

3. Right-click the CMF file, and select **Regenerate Schema Files** on the shortcut menu.



Add Information to the Catalog Database

This section describes modifying the Catalog Database by editing Excel workbooks and bulkloading the changes. You can also add or modify Catalog data using the Catalog task user interface. For more information, see the *Catalog User's Guide*.

1. Make a copy of the original **AllCodeLists.xls** file, which is located at [*Product Directory*]\\CatalogData\\BulkLoad\\DataFiles on the Smart 3D server.
2. Open the copy of **AllCodeLists.xls** to add the new fluid code object.

3. Locate the **Fluid Code** worksheet.



Microsoft Excel - AllCodeLists.xls

A	B	C
1	! Back to index	
2	Worksheet Name(s)	Revision Description
3		
4	Piping Commodity Type	Added following entries: "E22.5M1 22.5 degree elbow, 1-cut mitered 1201", "E22.5M2 22.5 degree elbow, 2-cut mitered 1202", "E22.5M3 22.5 degree elbow, 3-cut mitered 1203", "E22.5M4 22.5 degree elbow, 4-cut mitered 1204", "E22.5M5 22.5 degree elbow, 5-cut mitered 1205", "E30M1 30 degree elbow, 1-cut mitered 1226", "E30M2 30 degree elbow, 2-cut mitered 1227", "E30M3 30 degree elbow, 3-cut mitered 1228", "E30M4 30 degree elbow, 4-cut mitered 1229", "E30M5 30 degree elbow, 5-cut mitered 1230", "E45M4 45 degree elbow, 4-cut mitered 1346", "E45M5 45 degree elbow, 5-cut mitered 1347", "E60M1 60 degree elbow, 1-cut mitered 1376", "E60M2 60 degree elbow, 2-cut mitered 1377", "E60M3 60 degree elbow, 3-cut mitered 1378", "E60M4 60 degree elbow, 4-cut mitered 1379", "E60M5 60 degree elbow, 5-cut mitered 1380".
5	EquipmentTypes	Removed the highlight and set font color from Red to Blue for EquipmentTypes6 entries so that they are not in red (as they are supposed to be editable by the user).
6	StressReliefRequirement	Modified 'StressReliefRequirement' to 'StressReliefRequirement' - 't' was missing in Requirement.
7	GeometricIndustryStandard	Changed the GeometricIndustryStandardLongDescription of AWWA-C104 from "ANSI Standard for Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water" to "ASME Standard for Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water".
8	LoadSpanClassification	Added NEMA 12C+ 31, NEMA 20C+ 61 values.
9	CableTrayType	Added Ladder, marine rung 6, Ladder, strut rung 7 values.
10	CableTrayMaterials	Added 304 Stainless Steel 21, 316 Stainless Steel 22 values.
11	StructACToDoMessages, StructFeatureToDoMessages, StructPlatePartToDoMessages, StructEqpToDoMessages, StructFootngToDoMessages, StructSCToDoMessages, StructFCToDoMessages.	Added new sheets.
12	PropertyCategories, WBSItemPurpose, WBSProjectPurpose	Added note "Range 1000-7999 is reserved for SmartPlant applications, and range 8000-8999 is reserved for IntelliShip applications" Added following parent entries "Surface choke valves (Joule-Thomson valves) 914"

FlangeInsulationKitType / FlowDirection / FluidCode / GasketSelectionBasedOnFluidCode / Front

4. Under **Gas Fluid System**, insert the following **Corrosive** data:

1	2	A	B	C	D	E	F	G	H	I
.	54			GM	Make-up gas	218				
.	55			GN	Natural gas	221				
.	56			GNI	Nitrogen gas	224				
.	57			GOX	Oxygen gas	227				
.	58			GP	Purge gas	230				
.	59			GR	Reformed gas	233				
.	60			GS	Synthesis gas	236				
.	61			GSO	Sour gas	239				
.	62			GSW	Sweet gas	242				
.	63			GW	Waste gas	245				
.	64			GZ	Other gas	250				
.	65					30				
.	66			K	Solvent	341				
.	67			KG	Glycol	346				
.	68			KF	Furfural	351				
.	69			KD	Dewaxing	356				
.	70			KZ	Other solvent	370				
71		A	Corrosive			10100				
.	72	A		KA	(KA) Ammonia, Anhydrous	10101				
.	73	A		KC	(KC) Caustic	10102				
.	74	A		KP	(KP) Process Chemical	10103				
.	75	A		KW	(KW) Ammonia, Aqueous	10104				
.	76		Chemical			35				
.	77			M	Chemical	401				
.	78			MCI	Chemical Injection	402				
.	79			MAA	Anhydrous ammonia	405				
.	80			MAC	Aluminum chloride	409				
.	81			MAW	Aqueous ammonia	413				
.	82			MC5	0-50% caustic solution	417				
.	83			MCL	Dry chlorine	421				
.	84			MEO	Ethylene oxide	425				
.	85			MHC	Hydrogen chloride	429				
.	86			MIA	Inhibitor A	433				
.	87			MIB	Inhibitor B	434				
.	88			MLA	Lube oil additives	440				
.	89			MMA	MMAMethyl alcohol	444				
.	90			MS	Sulfur	448				
.	91			MSL	Liquid sulfur	452				
.	92			MZ	Other chemical	460				

5. Be sure to add an A in the first column on the left. The letter A indicates the Bulkload utility will add the value during the bulkload process.
6. When you are finished, save the file.
7. Add two properties called **SystemCode** and **EngineeringSystem** to a custom interface file. In this example, this file is named **EFCustomProps.xls** and looks like the illustration below:

A	B	C	D	E	F	G	H
1							
2	HEAD	ClassName	InterfaceName				
3							
4	Start						
5	!	Example of adding interfaces to virtual classes					
6	!	Adding interfaces to non-virtual classes					
9	a	CPPipelineSystem	IUCustom				
10	a	CPMPipeRun	IUCustom				
11							
12							
1							
2							
3	Head	InterfaceName	CategoryName	AttributeName	AttributeUserName	Type	UnitsType
4							
5	Start						
6	IUCustom	Standard	SystemCode	System Code	Char	0	
7	IUCustom	Standard	EngineeringSystem	Engineering System	Long	0	
8							
9	End						
10							
11							
12							

The **CustomClassInterfaceList** sheet is shown below:

A	B	C	D	E	F	G	H
1							
2	HEAD	ClassName	InterfaceName				
3							
4	Start						
5							
6	!	Example of adding interfaces to virtual classes					
7							
8							
9	!	Adding interfaces to non-virtual classes					
10	a	CPPipelineSystem	IUCustom				
11	a	CPMPipeRun	IUCustom				
12							

- Add the **EngineeringSystem** codelist. In this example, the file name is **EFCustomCodeList.xls**.

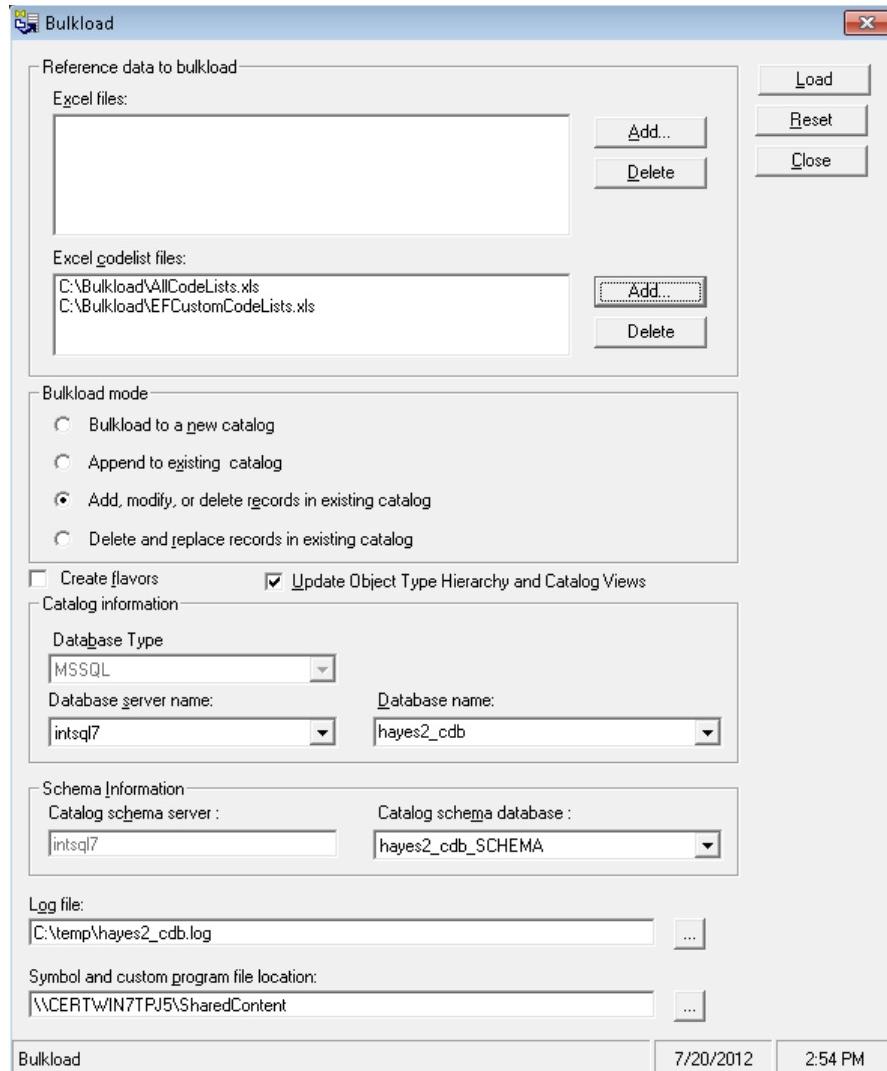
A	B	C	D	E	F
1	! Back to Index				
2					
3	!				
4	!				
5	HEAD	EngineeringSystem	EngineeringSystem	Codelist	Sort
		ShortDescription	LongDescription	Number	Order
6	START				
7	a	AA	Steam Gen & Fired Htr, Water/Steam Side	10111	
8	a	BA	Steam Generator and Fired Heater, Air/Gas Side	10112	
9	a	CA	Ammonia/Urea	10113	
10	a	DC	Crude Oil Production	10114	
11	a	EA	Auxillary AC Power Systems	10115	
12		END			
13					
14					

- Save the changes, and close Excel.

Bulk Load Data

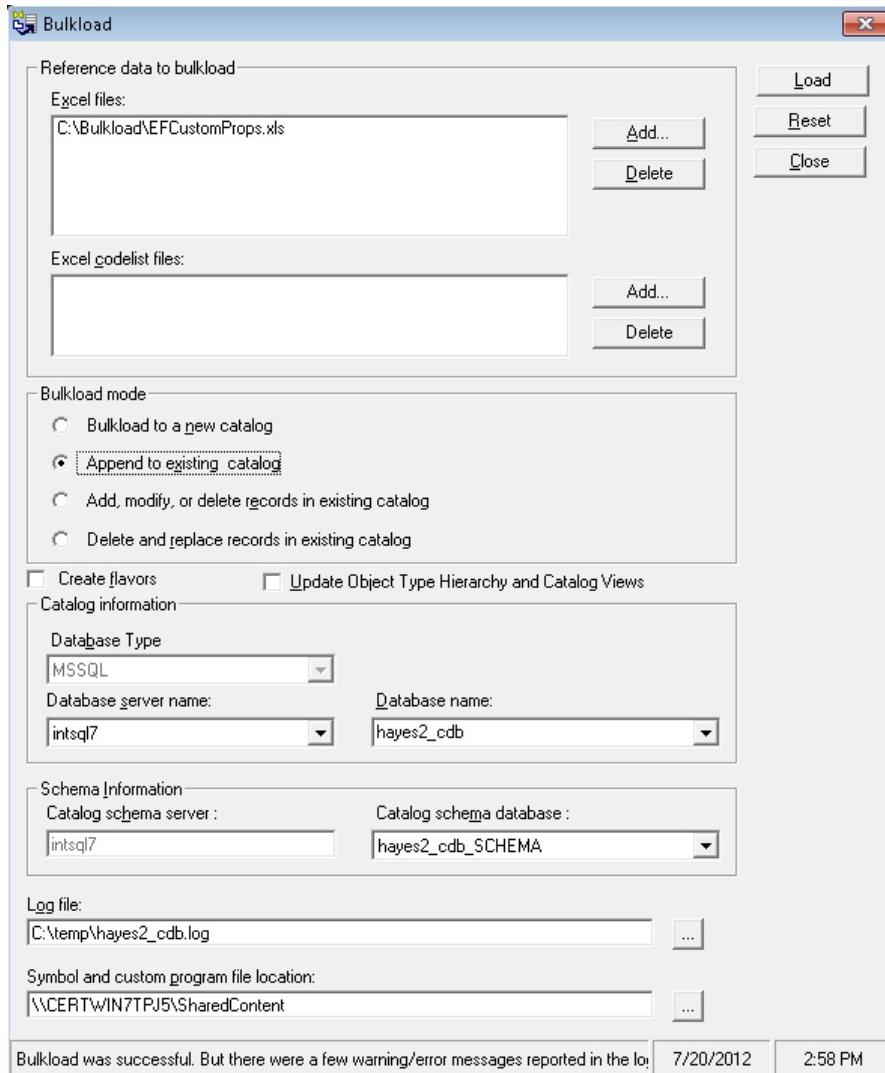
- Click **Start > All Programs > Intergraph Smart 3D > Database Tools > Bulkload Reference Data** to open the Bulkload utility.
- In the **Bulkload** utility, click **Add** beside the **Excel codelist files** field. Browse to the folder where your codelist files are located. In this example, the file names are **AllCodeLists.xls** and **EFCustomCodeLists.xls**.
- Under **Bulkload mode**, select **Append, modify, or delete records in existing catalog**.
- Under **Catalog information** and **Schema information**, select your **Catalog database server**, **Catalog database**, **Catalog schema database server**, and **Catalog schema database**.
- Specify a path and file name for the log file.

6. Specify the **SharedContent** folder in the **Symbol and custom program file location** field.



7. Click **Load**.
8. After the first load operation is complete, run the bulkload utility again for the custom properties file. Remove the two codelist files from the window using the **Delete** button, and

add the property file to the **Excel files** section using the **Add** button. The file name is **EFCustomProps.xls**.



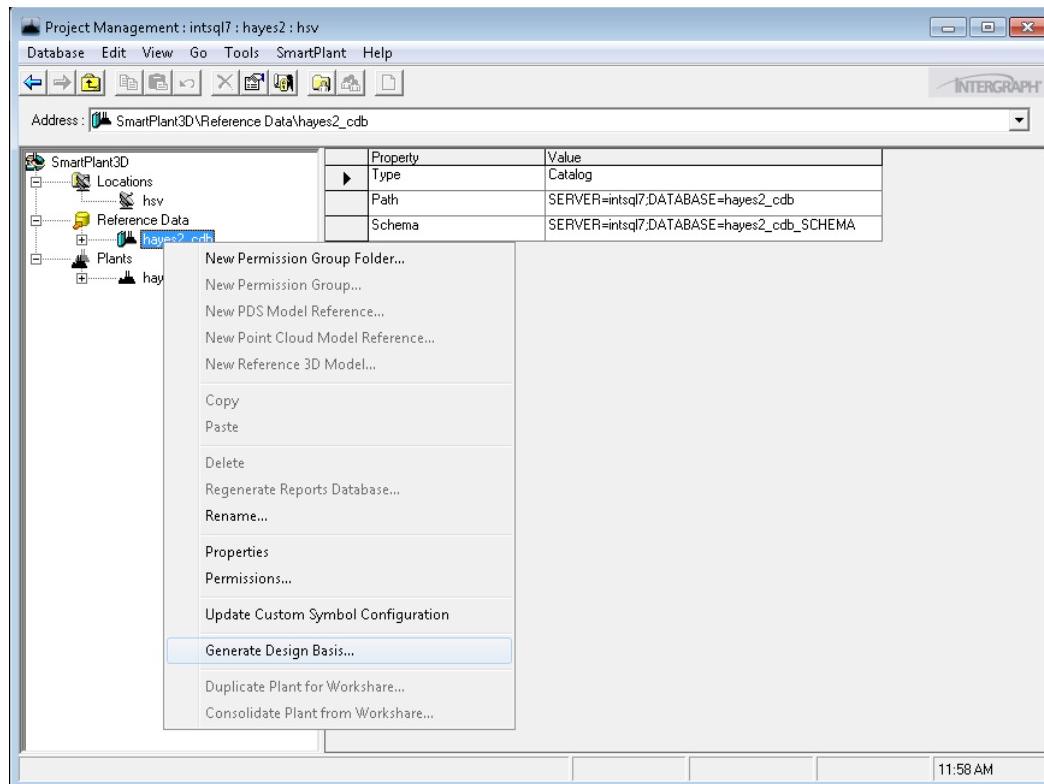
9. Change the mode to **Append to existing catalog**. The other settings will remain the same.
10. Click **Load**.
11. After the bulkload process is complete, click **Close**.

NOTE For more information about *Bulkloading*, see the *Reference Data Guide*.

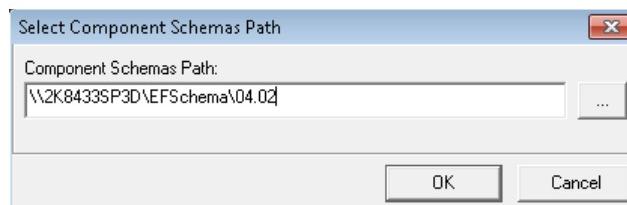
Generate Design Basis and Views

1. Click **Start > All Programs > Intergraph Smart 3D > Project Management**.
2. Expand **Reference Data**.

3. Right-click the catalog, and select **Generate Design Basis** on the shortcut menu.

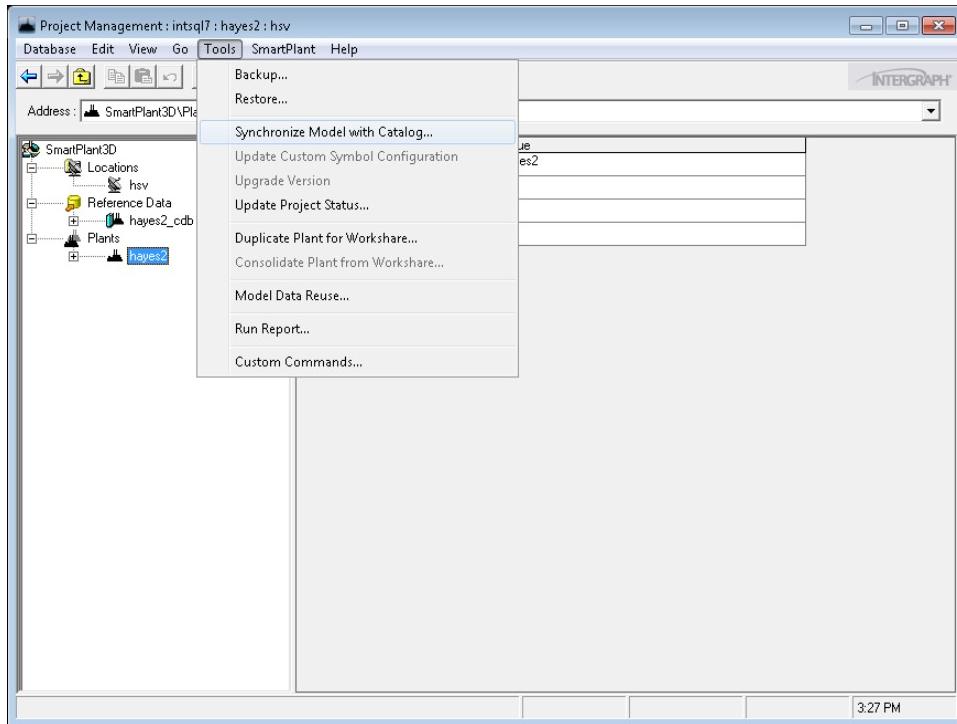


4. Click in the **Select Component Schemas Path** dialog box to browse to the folder where the component schemas are located, and click **OK**.

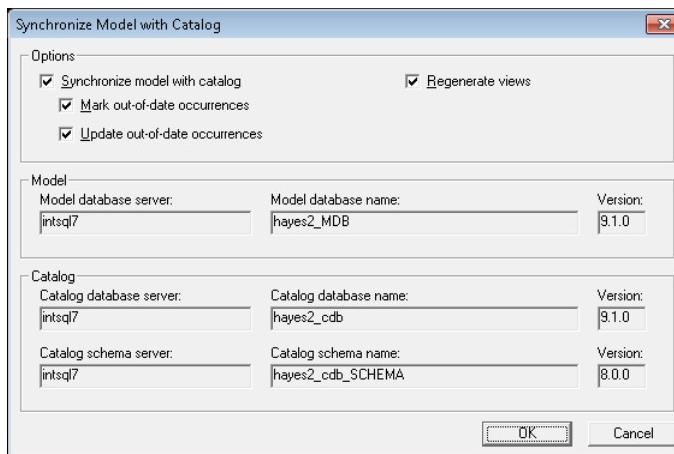


NOTE Remove the read-only properties of all the xml files located at
 \\server\SharedContent\Xml\DesignBasisSchemas

5. When the regeneration of the design basis is complete, generate the views for the database by selecting the plant, and clicking **Tools > Synchronize Model with Catalog**.

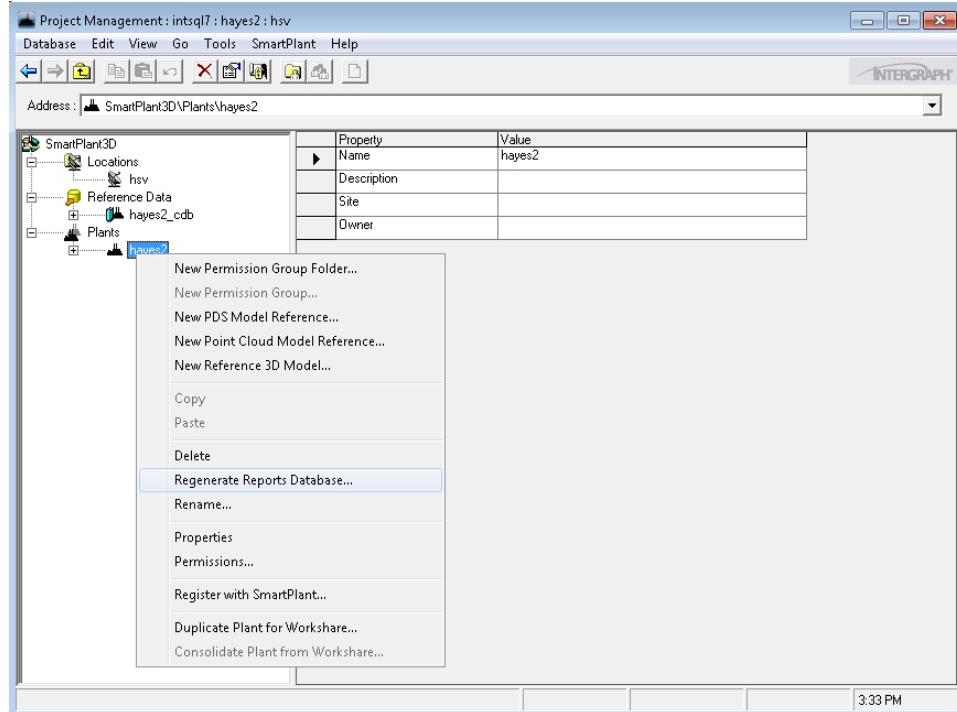


6. On the **Synchronize Model with Catalog** dialog box, review the information for the Model database and the Catalog Schema database. Only select **Regenerate views**. Clear all other options.

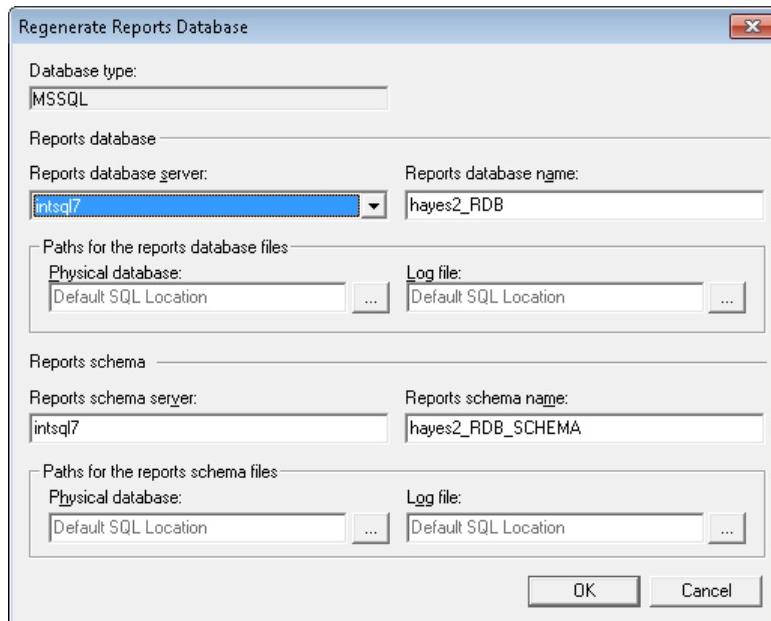


7. Click **OK**.

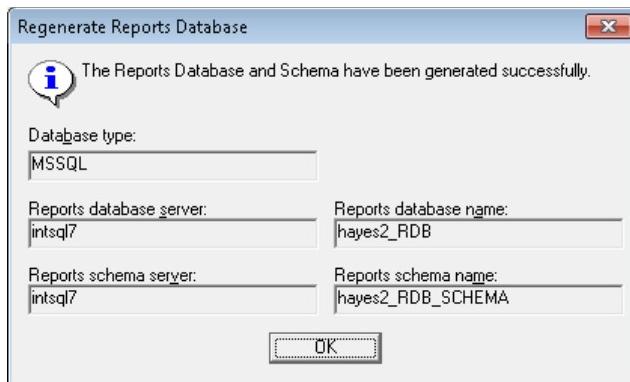
8. When the process is complete, right-click the plant, and select **Regenerate Reports Database**.



9. Confirm the information for the Reports database and the Reports schema database, and click **OK**.



The following message appears when the process is complete.



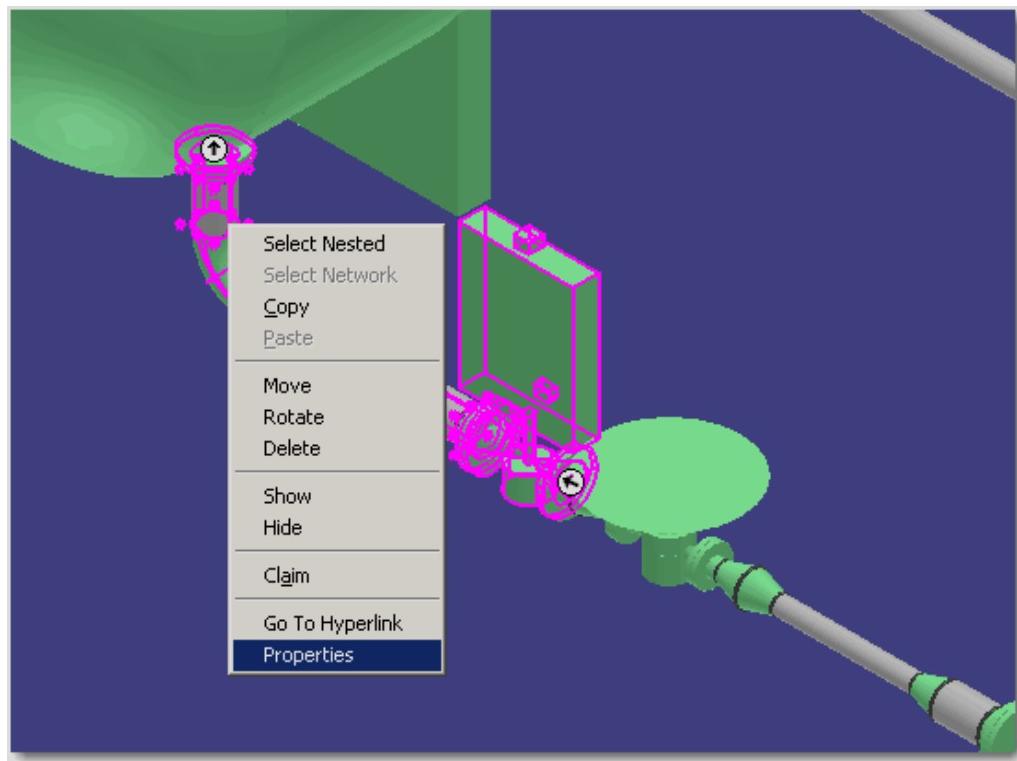
10. Click **File > Exit** to close the **Project Management** task.

Check the Properties in the Model

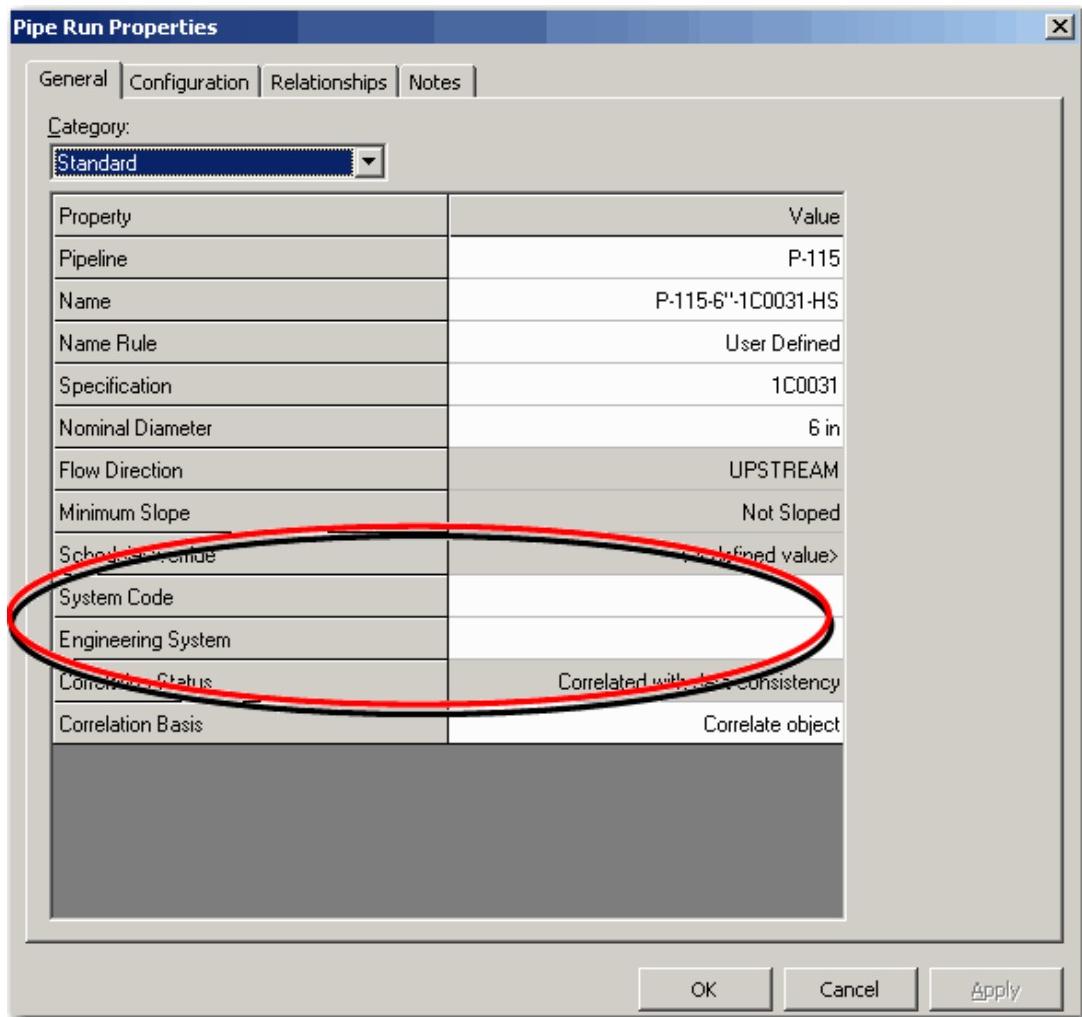
1. Click **All Programs > Intergraph Smart 3D > Smart 3D**.
2. Open a session that includes pipe runs.
3. Switch the locate filter in the upper left to **Piping Runs**.



4. Right-click a pipe run in the model, and select **Properties** on the shortcut menu.

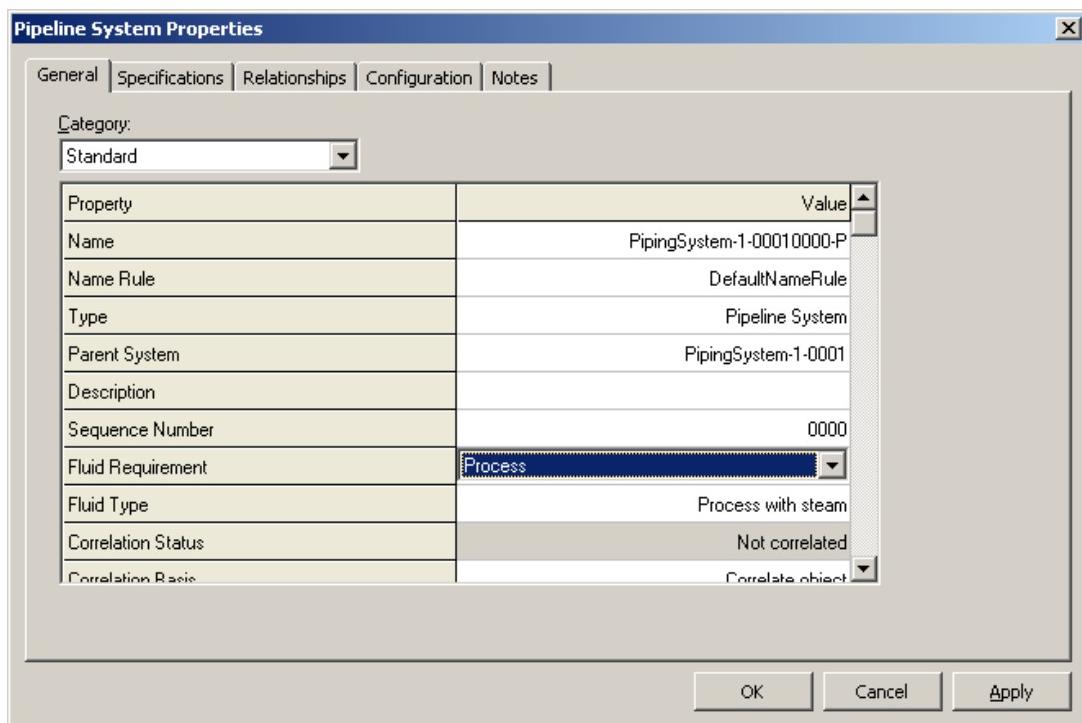


- In the **Standard** category, verify that the **System Code** and the **Engineering System** properties appear in the dialog box. Make sure that for **Engineering System**, the codelist entries appear.



- Click **OK** to close the properties dialog box.
- To check the **Fluid System**, switch the locate filter in the upper left to **Pipelines**.

- Right-click a pipeline in the model, and select **Properties** on the shortcut menu. Verify that **Corrosive** appears in the **Fluid Requirement** box and that the added values are available in the **Fluid Type** box.



Example: Mapping for Publish

This example describes how to create publish mapping for two properties between SmartPlant Foundation and Smart 3D.

Launch Schema Editor and Load the Smart 3D Tool Map Schema

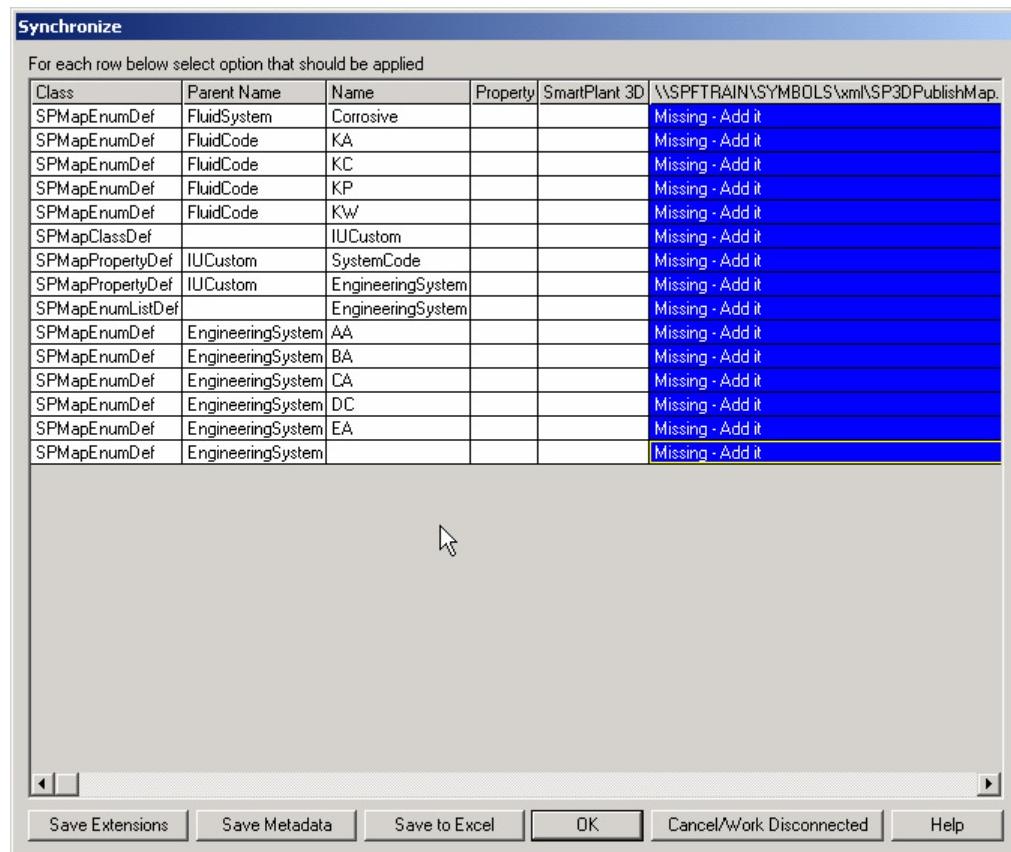
NOTE If you are creating mapping relationships but not extending the SmartPlant Schema, it is not necessary to check out the CMF file. However, you do need to open the CMF file along with the tool map schema to create the mapping relationships.

- In the Desktop Client, set your scope for the applicable plant, and then find the CMF file.
- Right-click the CMF file, and select **Launch Schema Editor**.
- On the **Set Active Configuration** dialog box, select the version of the schema that you want to view.
- Click **OK** to set the configuration, and open the Schema Editor.
- In the Schema Editor, click **File > SmartPlant > Edit Engineering Tool Options**, and select **Smart 3D** in the list of authoring tools to load the Smart 3D tool map schema.
- Under **Startup** options, select the **Load map schema** and **Connect to application schema** check boxes, and click **OK**.

- In each row in the **Synchronize** dialog box, the values in the tool database and tool map schema columns indicate actions to correct inconsistencies between the tool metadata and tool map schema. Select the appropriate action in each row, and then click **OK**.

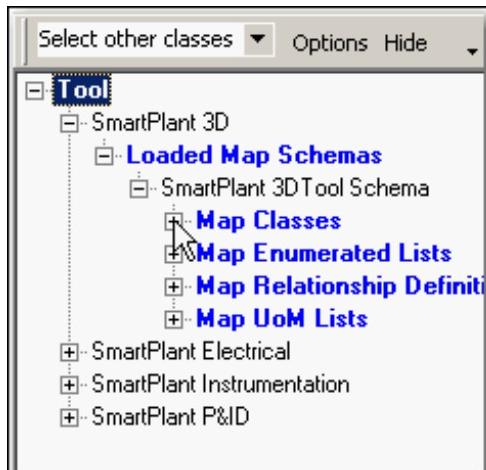
TIPS

- Each row represents a discrepancy between the tool database and the tool map schema.
- Default actions are blue when the **Synchronize** dialog box appears. However, if you select a different option, it will become blue instead.
- In many cases, only one operation is supported to synchronize the tool database and tool map schema. For example, if a new property was found in the database, the metadata adapter can add the property to the tool map schema, but it cannot remove the property from the tool database.

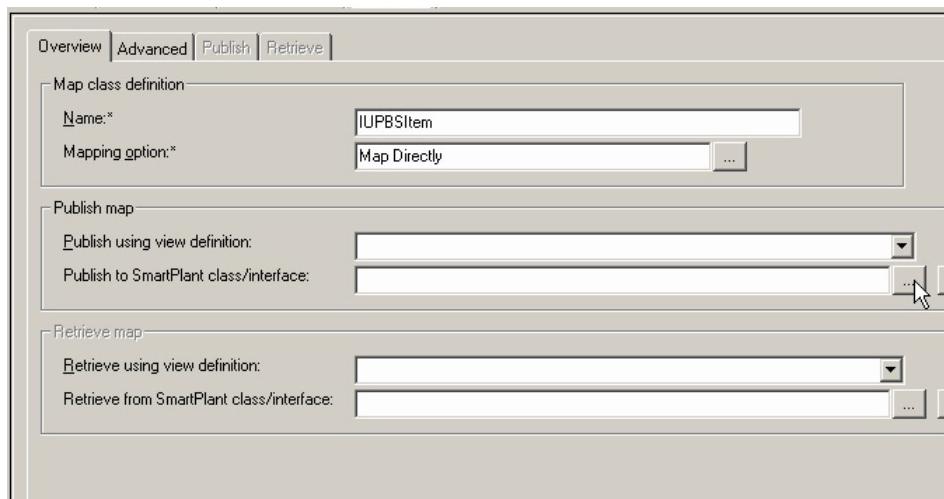


Map the New Custom Properties

1. In the **Map Environment**, expand **SmartPlant 3D > Loaded Map Schemas > SmartPlant 3D Tool Schema**.

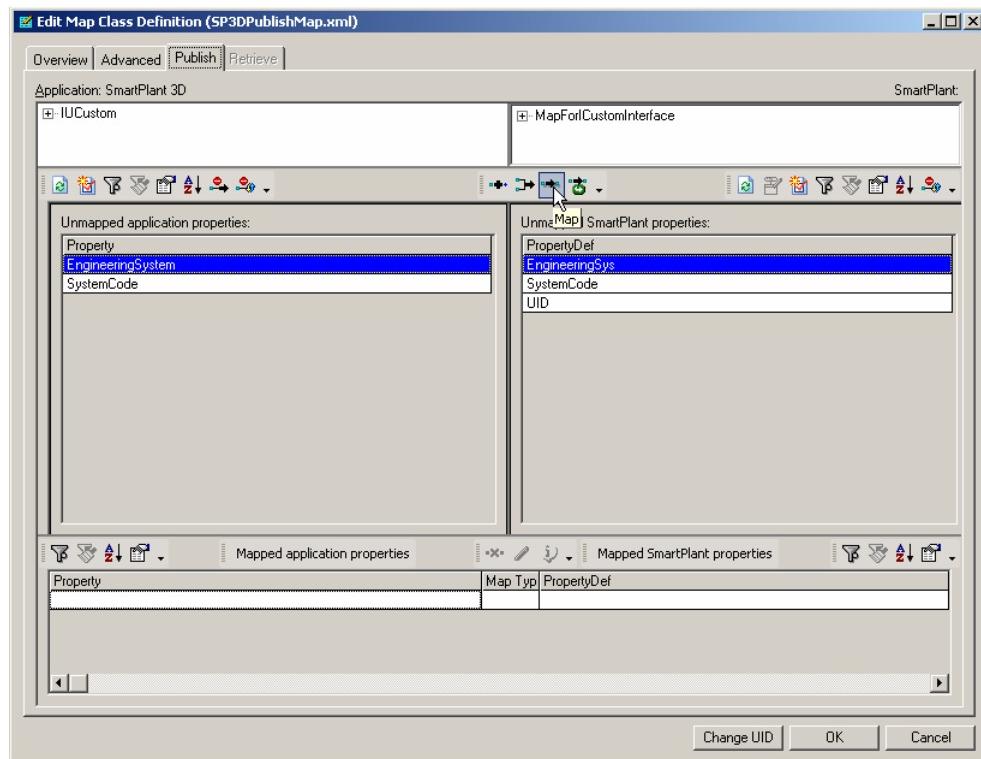


2. Expand the **Map Classes** node, and right-click **IUCustom**.
3. On the shortcut menu, select **Edit IUCustom**.
4. In the **Edit Map Class Definition** dialog box, click the browse button beside the **Publish to SmartPlant class/interface** field.



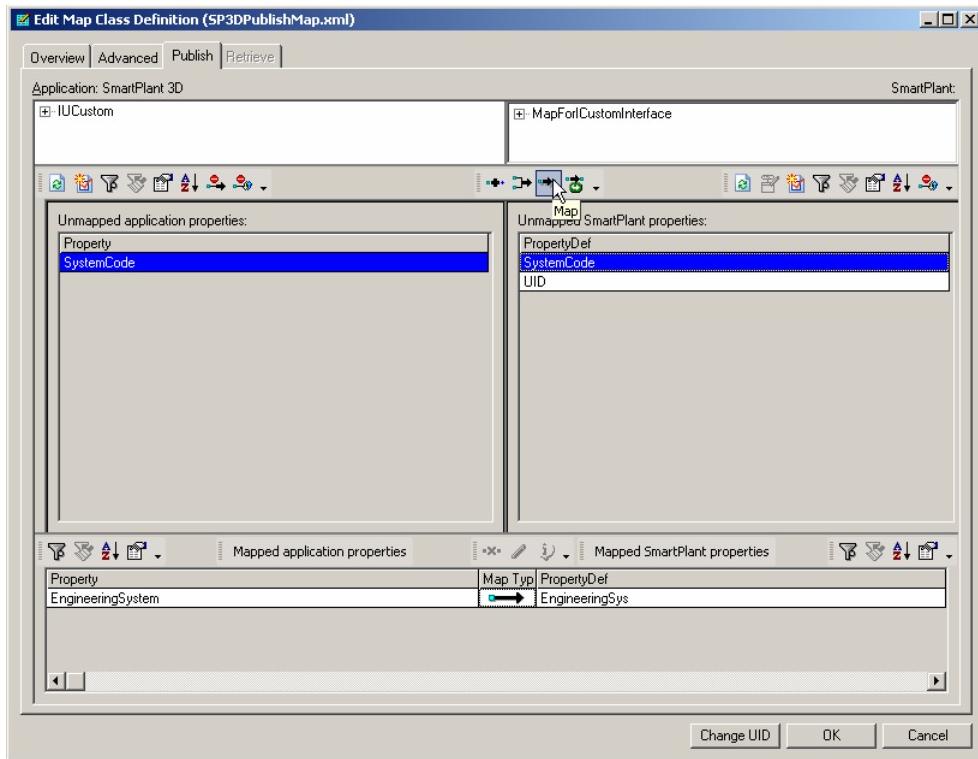
5. Find **ICustomInterface**, which is the SmartPlant Schema interface definition on which the custom properties are exposed. Select the check box beside **ICustomInterface**, and click **OK**.
6. Select the **Publish** tab.
7. Under **Unmapped application properties**, select **EngineeringSystem**.

8. Under **Unmapped SmartPlant properties**, select **EngineeringSys**.



9. Click **Map** .

10. Repeat steps 7-9 to map the **SystemCode** property.



11. Confirm that both properties have been mapped at the bottom of the window.

Mapped application properties		Mapped SmartPlant properties	
Property	Map Typ	PropertyDef	
EngineeringSystem	→	EngineeringSys	
SystemCode	→	SystemCode	

12. Click **OK**.

TIP To create mapping for correlation in Smart 3D, repeat steps 4 - 12 using the **Retrieve from SmartPlant class/interface** field and the **Retrieve** tab.

Save the Tool Map Schema

- Click **File > Save All Modified Files** to save the changes to the tool map schema.
- TIP** Because you did not change the SmartPlant schema, you do not need to save the CMF file.

NOTE When you close the Schema Editor, the software offers to save your connection information, user interface options, and loaded tool map schemas to a session file. Click **Yes** in the message box to save the session files so that you can use it to return to this working environment. However, you should not open a session file after launching the CMF file from the Desktop Client.

Removing Mapped Properties

Smart 3D objects contain numerous properties that are published to SmartPlant Foundation and SmartPlant Review. The properties to be published are defined in the SP3DPublishMap.xml file located on the Smart 3D server SharedContent share. You can edit this .xml file using Schema Editor to remove properties that you do not want to publish.

★ IMPORTANT

- This procedure uses the Schema Editor and should be attempted only by people familiar with working in the Schema Editor.
- We strongly recommend that you make copies of the delivered EFSchema.xml, P3DComponent.xml, and SP3DPublishMap.xml files before beginning this procedure so that you can return to the default delivered versions, if needed.

See Also

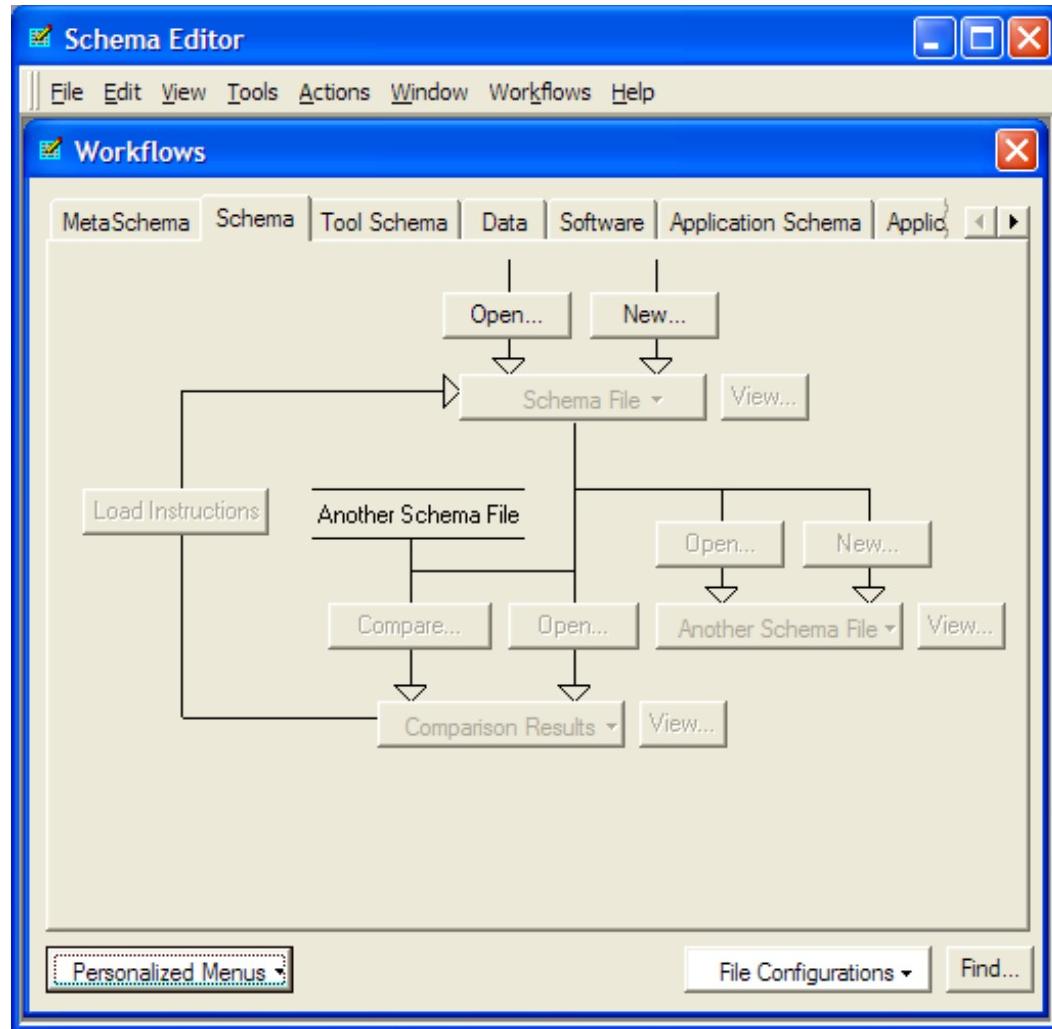
Remove Mapped Properties (on page 74)

Remove Mapped Properties

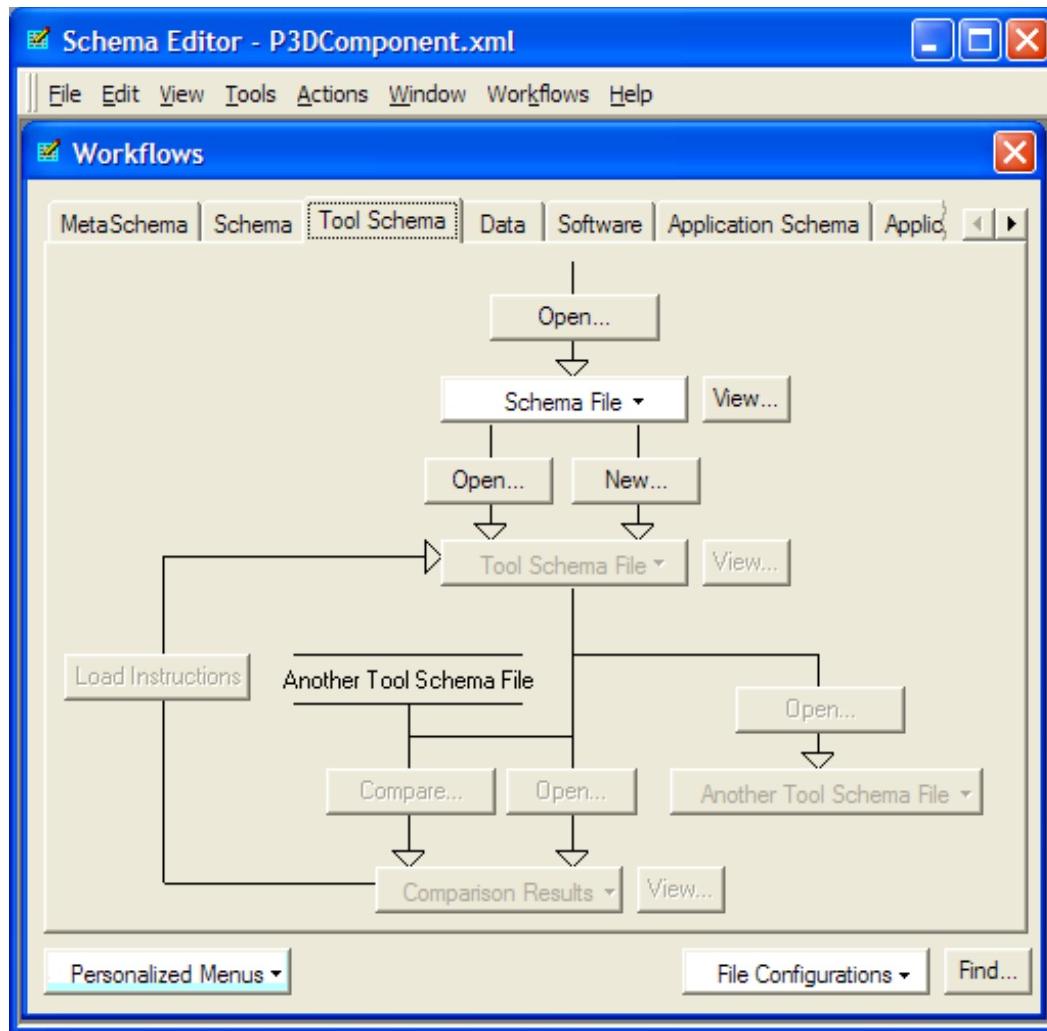
To begin, open the schema and tool schema files for editing in Schema Editor.

1. Start Schema Editor by clicking **Start > Programs > Intergraph SmartPlant Foundation > SmartPlant Schema Component > SmartPlant Schema Editor**.

2. On the **Workflows > Schema** tab, open the P3DComponent.xml (or EFSchema.xml) file.

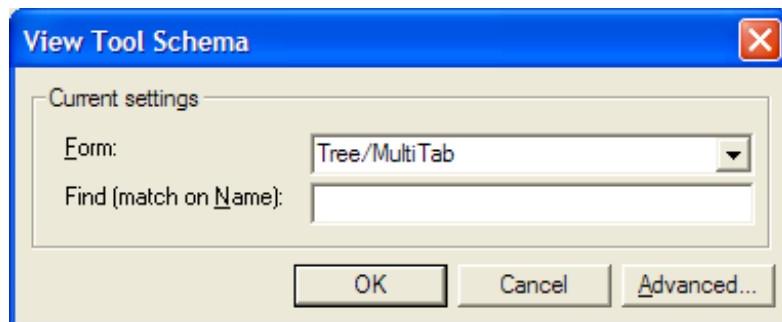


3. On the **Workflows > Tool Schema** tab, open the SP3DPublishMap.xml file.

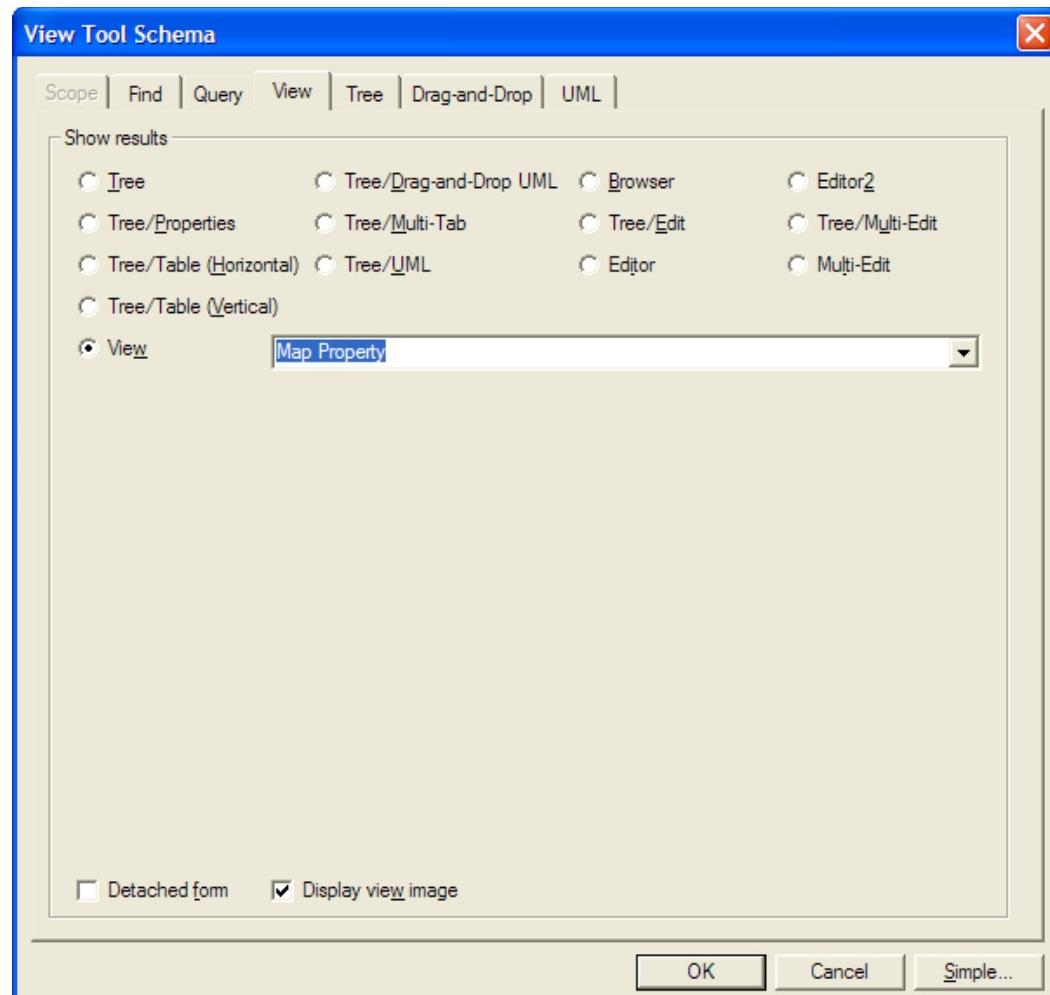


4. Now that you have loaded the schema and tool schema files, open a view that shows the MapProperty to Property mapping in order to delete the MapProperty to Property relationship. To do so, click the **View** button beside the **Tool Schema File** button to display the **View Tool Schema** dialog box.

NOTE If the **View Tool Schema** dialog box displays as shown below, click the **Advanced** button.



5. On the **View** tab, select the **View** option, and then select **Map Property**. Click **OK**.



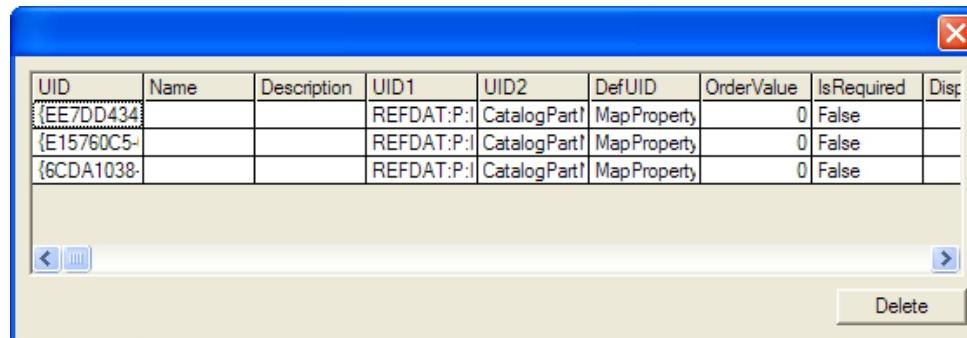
- Select the properties for which you want to remove the mapping (shown in the **MapToClassProperty** column), then right-click and select **Delete relationship**.

ClassCriteria	ProcessClassCriteria	SpecializationOfMapClass	MapsToClassDef	IsInterface
			I3DObject	True
			IPipeTapOcc	
			IInstrumentOcc	
			IDimensionedInstrument	
			IPipingPortComposition	
			IPipingSpecifiedItem	
			IConduitPathFeature	
			Delete relationship between IJRTePipeTapOccur and IPipeTapOcc	
			Create a Spreadsheet	
			Copy view to clipboard	
			Sort Data	
			Turn auto-update off	
			IPipingComponent	
			IConduitRun	

TIP If you are deleting a number of relationships, turn off auto-update to avoid waiting for the Schema Editor to update the screen after each relationship deletion. When you finish deleting relationships, right-click and select **Update** to perform all of the updates at once.

NOTES

- Schema Editor does not support multi-select when deleting the relationships, so you will need to remove the relationships one by one. Be sure to remove only the relationship and not the actual objects.
- Some properties will display another dialog box, similar to the one shown below for Catalog Part Number. This dialog box shows multiple relationships, each of which needs to be deleted.



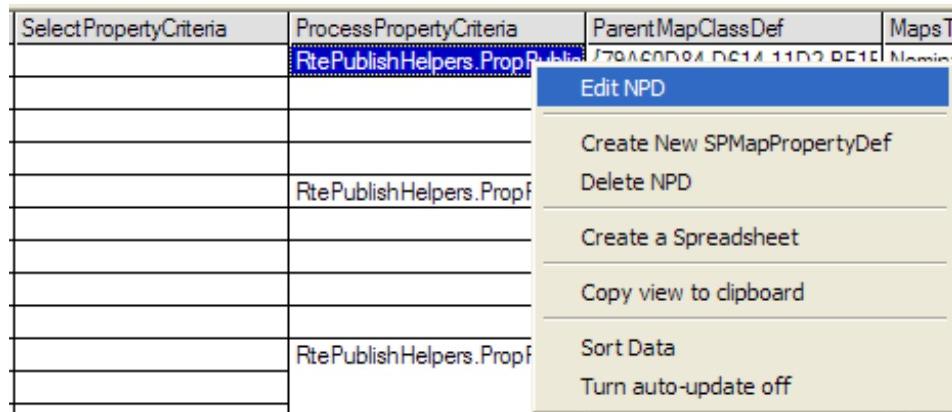
The P3D Component Schema contains the following two required properties that are exposed on required interfaces and that have values that must be non- null. Unmapping the tool properties that map to these properties results in null values being published for these properties in the data xml. This results in validation errors being reported for such instances in the data xml.

InterfaceDef: IEquipment
PropertyDef: EqType0

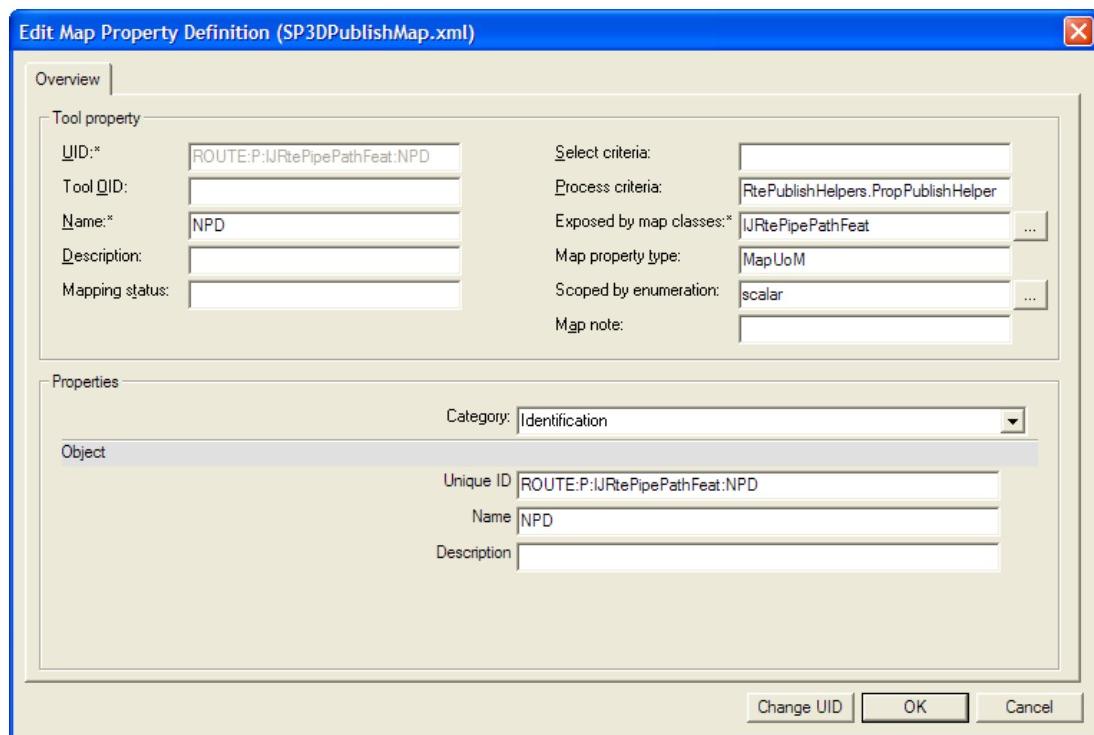
InterfaceDef: IEquipmentComponent
 PropertyDef: ProcessEqCompType1

- In addition to removing the MapsToClassProperty relationship, you must also clear any SelectPropertyCriteria and ProcessPropertyCriteria entries that are shown for the properties that you are unmapping.

To do this, right-click the entry in the ProcessPropertyCriteria column, and select **Edit**.

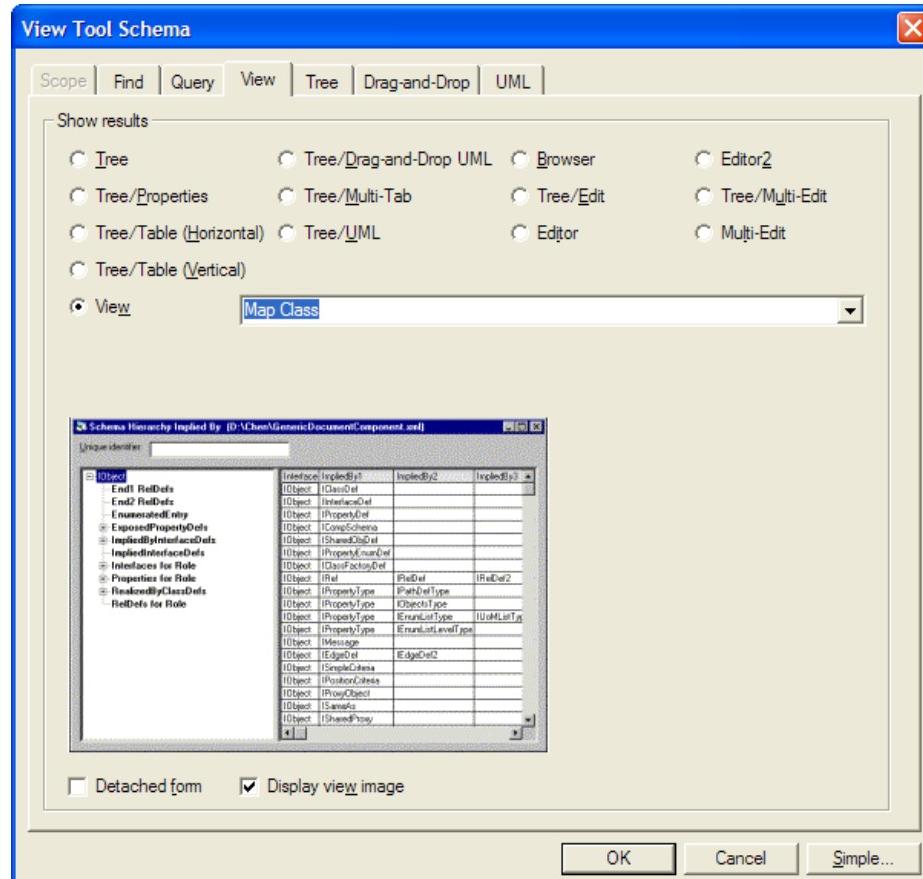


In the **Edit Map Property Definition** dialog box, clear any entries in the **Select criteria** and **Process criteria** fields, and then click **OK**.



- After you finish unmapping the properties, close the window to return to the **Schema Editor Workflows** dialog box.

9. Now that you have unmapped the properties, you must also unmap the classes and delete the MapClass to Class relationship for the interfaces. To do this, click the **View** button beside the **Tool Schema File** button to display the **View Tool Schema** dialog box.
10. On the **View** tab, select the **View** option, and then select **Map Class**. Click **OK**.



11. The **IsInterface** column displays a Boolean (True or False) value indicating whether the class is an interface. Sort the view by clicking the **IsInterface** column header, then scroll down to the first occurrence where **IsInterface** = True.

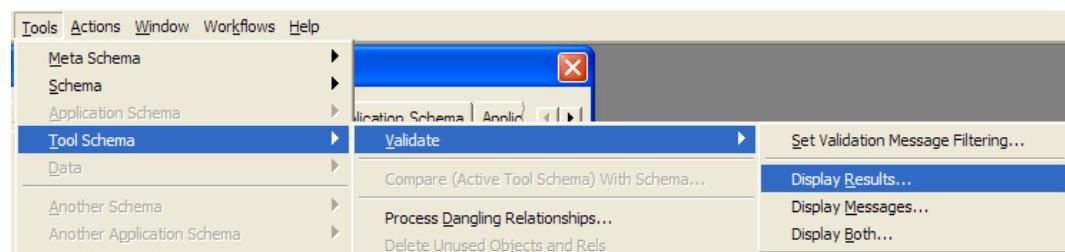
12. In the **MapsToClassDef** column, right-click each interface for which you want to remove the mapping, and select **Delete Relationship**.

ClassCriteria	ProcessClassCriteria	SpecializationOfMapClass	MapsToClassDef	IsInterface
			I3DObject	True
			IPipeTapOcc	
			IInstrumentOcc	
			IDimensionedInstrument	
			IPipingPortComposition	
			IPipingSpecifiedItem	
			IConduitPathFeature	
			Delete relationship between IJRTePipeTapOccur and IPipeTapOcc	
			Create a Spreadsheet	
			Copy view to clipboard	
			Sort Data	
			Turn auto-update off	
			IPipingComponent	
			IConduitRun	

NOTES

- Delete only the relationships. Do not delete the objects themselves.
- Do **not** delete the IObject classdef relationship.

13. Just as in step 7, in addition to removing the MapsToClassDef relationship, you must also clear any SelectClassCriteria and ProcessClassCriteria entries that are shown for the interfaces that you are unmapping. To do this, right-click the entry in the **ProcessPropertyCriteria** column, and select **Edit**. On the **Edit Map Property Definition** dialog box, clear any entries in the **Select criteria** and Process criteria fields, and then click **OK**.
14. After you finish unmapping the properties, close the window to return to the **Schema Editor > Workflows** dialog box.
15. Click **Tools > Tool Schema > Validate > Display Results** to validate the Tool Schema file to make sure that no new validation errors were introduced while editing the schema files.



16. Save the Tool Schema (SP3DPublishMap.xml) file. Use this modified Tool Map Schema file for updating the 3D model data document.

See Also

Removing Mapped Properties (on page 74)

Using Catalog Data in an Integrated Environment

For proper P&ID correlation when you use the software in an integrated environment, SmartPlant P&ID and Smart 3D must use the same naming convention for piping components and equipment.

One example is piping reducers. You can open the Excel workbook for piping components in Smart 3D, and change the name "Concentric Size Change" to "Concentric Reducer".

Alternatively, you can copy the existing rows and add new entries, as shown below. Save the workbook, and bulk load it into the Catalog.

82		Concentric Reducer	1	1	1.5 in	0.75	1 in
83		Concentric Reducer	1	2	2 in	0.75	1.5 in
84		Concentric Reducer	1	3	4 in	0.75	1.5 in
85		Concentric Reducer	1	3	4 in	2	2 in
86		Concentric Reducer	1	4	36 in	3	34 in
87		Concentric Size Change	1	1	1.5 in	0.75	1 in
88		Concentric Size Change	1	2	2 in	0.75	1.5 in
89		Concentric Size Change	1	3	4 in	0.75	1.5 in
90		Concentric Size Change	1	3	4 in	2	2 in
91		Concentric Size Change	1	4	36 in	3	34 in

SECTION 4

Learning about SmartPlant User Functions in the Software

When working with Smart 3D in an integrated environment, you can perform the following tasks:

- Populating a Work Breakdown Structure
- Retrieving data
- Viewing P&IDs
- Correlating and comparing the model with the design basis
- Revising documents
- Publishing drawings, reports, and 3D model data

Workflow for Smart 3D in an Integrated Environment

The following tasks are used when you work with Smart 3D in an integrated environment.

Register with SmartPlant

Before starting the workflow, an administrator must register the model in the Project Management task. There can be only one registration per model. For more information, see the *Project Management User's Guide* available from **Help > Printable Guides**.

When you register the model, you create a relationship between the local model and the SmartPlant Foundation URL/plant. This operation creates a unique signature for the tool/model combination being registered.

Retrieve Documents

Retrieve documents such as PBS, P&IDs, and instrument DDPs (Dimensional Data for Piping). The software allows you to retrieve the documents that pertain to the active model only. For more information, see *Retrieve Documents* (on page 102). To retrieve an electrical cable schedule, go to the Electrical task to perform the retrieve. For more information, see the *Electrical User's Guide*.

Update Retrieved Data

There are several ways to update the retrieved data. For information on any of the commands listed below, see SmartPlant Menu.

- Use the **View P&ID** command to open a retrieved P&ID. You can view correlated objects (new or changed objects) using the P&ID Viewer. You can view deleted objects using a filter with the **Correlation Status** property.
- Use the **Correlate with Design Basis** and **Compare Design Basis** commands to trace the differences between the P&ID and the 3D model. The **Correlate with Design Basis**

command is used to correlate objects previously modeled in Smart 3D to the retrieved P&IDs.

- Use the **View Cable Schedule** command to create and update the retrieved electrical cables in 3D model. For more information, see View Cable Schedule.

Model and Update Objects

Model piping, instrumentation, and equipment objects while using the P&ID as a visual **To Do List**.

Publish Documents

Create and publish drawings and reports, if necessary. You can also publish 3D model data in the Drawings and Reports task or using the **Tools > Drawing Console** command. For more information, see the Drawings and Reports Help.

NOTE After publishing the 3D Model Data, you can view the data in SmartPlant Foundation and SmartPlant Review.

Back Up the Database

Back up the databases in the Project Management task. For more information, see the *Project Management User's Guide*.

WBS Items and Projects

In Smart 3D, the Work Breakdown Structure (WBS) provides a means to define additional groupings of design objects for a variety of work purposes. In the software, the currently active Work Breakdown Structure project is shown in the drop-down list in the upper left-hand corner of the task window, next to the **Permission Group** box.



TIP Each time you create a new session, a blank row is the default. This blank row indicates that the active project or WBS item is set to "none."

Work Breakdown Structure grouping is hierarchical. Objects are assigned at lower levels in the hierarchy, and higher levels automatically provide consolidation. The first level of grouping object is the project. Under the project level, you can nest additional types of groupings called WBS items. Typically, WBS grouping is used for activities at the end of the engineering phase, such as activities related to the generation of deliverables and construction techniques. The following are some examples of the practical usage of WBS functionality in the software:

- **Manual Piping Isometric Sheet Management** - Normally when a pipeline isometric is generated using ISOGEN, the software automatically breaks the pipeline into multiple sheets; however, in order to reduce the number of drawings to be issued in case of revisions, many companies control the sheet assignment manually. Smart 3D provides functionality to automatically group and assign objects to a WBS item that represents a single sheet of piping isometric drawing.
- **Modularization of Pipe Racks** - In many projects, pipe racks are pre-fabricated in sections and shipped to the site for installation. A number of sections could be large on a project. You can use WBS grouping to define modules representing pipe rack sections.

- **Work Package Definition** - Although the definition of Work Package varies widely, Smart 3D WBS functionality can be applied in most situations. Typically, design objects belong to multiple work packages, which is allowed by WBS assignment logic.
- **Use of 3D models in Operation and Maintenance** – In a typical plant, the actual plant and 3D model representation keep changing due to small and large projects to improve the plant. The as-built project is used to maintain current state of the model. You can either copy or move 3D objects to different WBS projects to manage changes being made. The Smart 3D Drawings and Reports task provides functionality to distinguish objects on the drawing based on their association with the WBS project. For example, as-built objects can be shown in one color/line style and upcoming changes related to a project can be shown in a different color/line style.

In the Common task, you can create new WBS projects and items or edit existing ones. The **New WBS Project** and **New WBS Items** commands appear on the shortcut menu when you right-click a WBS project folder or a WBS item on the **WBS** tab in the **Workspace Explorer**.

NOTES

- Implementing WBS functionality on a project requires making decisions on common factors regardless of the end goal. Careful planning and decision making based on a study of the following factors will lead to successful usage of WBS functionality on projects. For more information, see *Appendix: Implementing a Work Breakdown Structure (WBS)*.
- When you edit an object, it retains the current project and/or WBS item relationship.
- In the Drawings and Reports task, the WBS is used in conjunction with publishing.

Create WBS Item

Creates a new Work Breakdown Structure (WBS) item. You access this command by right-clicking a WBS project folder on the **WBS** tab in the **Workspace Explorer**, and selecting **Create WBS Item**.

See Also

Create a New WBS Item (on page 91)

WBS Item Edit Ribbon

Sets the options for the properties of a Work Breakdown Structure (WBS) item. You can use this ribbon to assign objects in the model to a WBS item.

Properties

Views and edits the properties of the WBS item. For more information, see *WBS Item Properties Dialog Box* (on page 86).

Select objects to assign

Associates objects in the model with the WBS item.

Clear all

Disassociates all previously selected objects in the model with the WBS item.

Finish

Commits the changes to the database.

Type

Displays the type of the WBS item.

Purpose

Displays the purpose of the WBS item.

Name

Displays the name of the WBS item. You can type a different name if necessary.

WBS Parent

Displays the parent of the WBS item. You can select a different parent if necessary.

See Also

WBS Items and Projects (on page 84)

WBS Item Properties Dialog Box

Displays the properties of the Work Breakdown Structure (WBS) items for edit and review. This dialog box opens when you right-click a WBS item in the **Workspace Explorer** and then click **Properties**.

See Also

Create WBS Item (on page 85)

WBS Items and Projects (on page 84)

General Tab (WBS Item Properties Dialog Box)

NOTE The following common properties are provided for the **Standard** category and are identical to those that display on the **Create WBS Item** dialog box.

Displays options for defining the properties of a new WBS item.

WBS Type

Specifies the type of WBS item. Available options are defined in the current active Catalog database. The list is defined by the WBSItemType codelist.

WBS Purpose

Specifies the purpose of the WBS item. You cannot change this property after you create the WBS item. Available options are defined in the current active Catalog database and depend on which **WBS Type** you selected. The list is defined by the WBSItemPurpose codelist.

NOTE If you intend to create multiple WBS Items under the same WBS Project that use more than one type of **WBS Purpose > Iso Drawing** (codelist entries 195-215), you must create a separate label for each style of **Iso Drawing** used in the project. For more information on creating labels, see the *Piping Isometric Drawings User's Guide*.

Exclusive

Specifies whether an object can be related to more than one Work Breakdown Structure (WBS) object of the same type and purpose.

True indicates that the given object cannot be assigned to another WBS item of the same type and purpose.

False indicates that the given object can belong to multiple WBS items of the same type and

purpose.

After the WBS item has an assigned object, this property becomes read-only.

NOTE All WBS items of the same type and purpose in a given project must have the same setting for the **Exclusive** property.

WBS Assignment

Specifies the assignment type. The assignment type you select here controls the behavior of the **Assign to WBS** command in the software. The list is defined by the WBSItemAssignment codelist.

System indicates that Smart 3D automatically assigns all nested children of the system object to the WBS item. As you add or remove objects from that system, you can update the assignment with **Update WBS Assignment**.

Assembly indicates that Smart 3D automatically assigns all nested children of the assembly object to the WBS item. As you add to or remove objects from that assembly, you can update the assignment with **Update WBS Assignment**.

Manual indicates that Smart 3D only assigns the selected object to the WBS item. There is no automatic assignment based on system parent or assembly. The software does not automatically update WBS assignments for objects belonging to this WBS when you run **Update WBS Assignments** or **Assign to WBS**. This is the default setting.

For any given WBS type or purpose, you can assign all systems or all assemblies, but not a mixture of both. After the WBS item has an assigned object, this property becomes read-only. To modify the assignment type, you must create a new WBS item. This option is enabled only when **Exclusive** is set to **True**.

WBS Parent

Identifies the higher-level object that is associated with the WBS item that you are creating. When the WBS item is created, this property is set to read-only.

Name

Specifies a name for the WBS item.

Correlation Status

Displays the correlation status assigned by the software. This value is read-only. The following table provides a description of the correlation statuses:

Status	Description
Correlated with data match	Represents objects that have a data match between the design basis data and the objects in the three-dimensional model.
Correlated with data mismatch	Represents objects that have a correlation with the design basis. However, these objects have a discrepancy, which generates the mismatch. The cause of the discrepancy can result from changes in the P&ID or the 3D model.
Correlated with approved data mismatch	Represents objects that have a correlation with the design basis. However, these objects have approved data discrepancies.

Correlated with approved topology mismatch	Represents objects that have a correlation with the design basis. However, these objects have approved topology discrepancy.
Not correlated yet	Objects that have either not been modeled from the P&ID or that have been modeled but have not been correlated with design basis data.
Ignored or not claimed (Project Management environment only)	Shows that the object either is not claimed (that is, it exists in the as-built condition), or that the software ignores the object (for example, revision clouds and labels).

Correlation Basis

Specifies if the object is correlated to a corresponding design basis. Select **Correlate Object** to associate the objects in three-dimensional model with the design basis. Select **No correlation is required** if the objects do not have a correlating design basis data.

Correlation Approval Status

Specifies if the component is approved with discrepancies in the three-dimensional data compared with design basis data. Select **Topology mismatch approved** if components topology mismatch can be ignored. Select **Data and Topology mismatches approved** if the components data and topology mismatches can be ignored. Select **None** if you do not want to approve a mismatch.

See Also

[Create a New WBS Project \(on page 94\)](#)
[WBS Item Properties Dialog Box \(on page 86\)](#)

Configuration Tab

Displays the creation, modification, and status information about an object.

NOTE You cannot define the filters using the **Configuration** tab.

Plant

Displays the name of the model. You cannot change this value.

Permission Group

Specifies the permission group to which the object belongs. You can select another permission group, if needed. Permission groups are created in Project Management.

Transfer

Reassigns ownership of the selected model objects from their current permission group to another satellite or host permission group. This option is only available if the active model or project is replicated in a workshare configuration. The option is not available if all of the objects in the select set already belong to another location and are non-transferable. For more information, see *Transfer Ownership Dialog Box* in the *Common User's Guide*.

NOTE The **Transfer** option does not apply to the filters and surface style rules.

Approval State

Specifies the current status of the selected object or filter. The display depends on your access level. You might be unable to change the status of the object. The list is defined by

the ApprovalStatus codelist.

NOTE You can only edit or manipulate an object with a status of **Working**.

Status

Specifies the location of the object in the workflow process. Changing this property sets the **Approval State**. The list is controlled by the ApprovalReason codelist in the ApprovalReason.xls file. You must bulkload this file. For more information, see *ApprovalReason* in the *Reference Data Guide*.

Date Created

Specifies the creation date of the object.

Created by

Specifies the name of the person who created the object.

Date Last Modified

Specifies the date when the object was last modified.

Last Modified by

Specifies the name of the person who last modified the object.

Transfer Ownership Dialog Box

Allows you to specify a new location and permission group for the selected model objects.

Current location

Displays the name of the location with which the current permission group is associated. All of the objects in the select set must belong to the same location.

Current permission group

Displays the name of the permission group with which the selected objects are currently associated. If all of the objects in the select set do not belong to the same permission group, this box appears blank.

New location

Specifies the name of the location to which you want to assign the objects. In a global workshare configuration, this box lists all the locations in which you have write access to one or more permission groups. The selection in this box filters the entries in the **New permission group** box.

New permission group

Specifies the new permission group to which to assign the selected objects. If you specify a value in the **New location** box, this list displays all permission groups to which you have write access in the selected location. If you do not specify a value in the **New location** box, this list includes all permission groups to which you have write access in all locations except the current location. This box is blank if you do not have write access to any permission groups at any locations other than the current one.

NOTE We strongly recommend that administrators follow naming convention rules that include the location as a prefix in the permission group name.

Notes Tab

Creates and edits user-definable text placed by the designer on an object in the model. The notes provide special instructions related to the object for the fabricator and are available in downstream tasks. For example, the notes appear in two-dimensional drawings and within design review sessions.

NOTE Only one note of a given kind from a given object can be shown on a drawing. For example, if there are two fabrication notes on a piping part, then only one of the notes shows on the drawing. It is important to know about and to consider this situation when defining notes on an object in the modeling phase. For example, you can display one Fabrication note and one Installation note by defining two separate labels for the two kinds of notes.

Key point

Specifies the key point on the object to which you want to add a note.

Notes at this location, listed by name

Lists all notes for the selected key point on the object.

Date

Displays the date that the note was created. The system automatically supplies the date.

Time

Displays the time that the note was created. The system automatically supplies the time.

Purpose of note

Specifies the purpose of the note.

Author

Displays the login name of the person who created the note. The system automatically supplies this information. You cannot change this information.

Note text

Defines the note text. The software does not limit the length of the note text.

Show dimension

Indicates that the note generates a dimension.

If you are displaying the properties for a Support component, then a dimension can be included for the component in the Support drawings, if you select the **Show dimension** option. The note must be associated with one of the key points for the Support component. It is recommended that you set the **Purpose of note** as **Fabrication**, but this is not a requirement. The note **Name** and **Note text** are not used when you select this option.

New Note

Creates a new note on the object.

Standard Note

Displays a list of standard notes from which you can select. This feature is not available in this version.

Highlight Note

Highlights the note in the graphic view so that you can easily find the note and the object to which it is related. This feature is not available in this version.

Delete Note

Deletes the currently displayed note.

Create a New WBS Item

1. Right-click a WBS project folder on the **WBS** tab in the **Workspace Explorer**, and select **Create WBS Item**.

On the **Create WBS Item** dialog box, specify a name for the new WBS item, and set the properties as needed.

2. Click **OK**.

*The new WBS item is created in the **Workspace Explorer** hierarchy.*

NOTES

- The **Exclusive** property controls whether objects can belong to more than one WBS item that has the same type and purpose.
- All WBS items of the same type and purpose in a given project must have the same settings for the **Exclusive** property.
- The **WBS Assignment** property controls the behavior of the **Assign to WBS** command. For example, you can define properties that allow you to use the system or assembly hierarchy to automatically assign objects to the WBS item.
- When a WBS item is created in Smart 3D, the following properties are set to read-only: **WBS Parent** and **Correlation Status**. After a WBS item has an assigned object, the following properties become read-only: **Exclusive** and **WBS Assignment**.
- You can undo the creation of a new WBS item.
- You can copy and paste a new WBS item.

Create WBS Project

Creates a new project. You access this command by right-clicking a WBS project folder on the **WBS** tab in the **Workspace Explorer**, and then selecting **Create WBS Project**.

See Also

Create a New WBS Project (on page 94)

WBS Project Edit Ribbon

Sets project properties. You can use also this ribbon to assign objects in the model to a project.

Properties

Views and edits the properties of the project. For more information, see *WBS Project Properties Dialog Box* (on page 92).

Type

Displays the type of the project.

Purpose

Displays the purpose of the project.

Name

Specifies the name of the project.

WBS Parent

Displays the parent of the project. You cannot change the parent of the project; the parent is always the root node of the hierarchy.

See Also

WBS Items and Projects (on page 84)

WBS Project Properties Dialog Box

Displays the properties of the projects for edit and review. This dialog box opens when you right-click a project folder in the **Workspace Explorer**, and then select **Properties**.

See Also

Configuration Tab (on page 88)

General Tab (WBS Project Properties Dialog Box) (on page 92)

Notes Tab (on page 90)

General Tab (WBS Project Properties Dialog Box)

Displays high-level properties that identify the project, such as purpose, status, and correlation facts.

Displays options for defining the properties of a new WBS project.

Type

Displays the project type.

Project Purpose

Specifies either **As-built** or **Project**. Only one as-built WBS project is allowed per model. You cannot change purpose of the project after you create the project. This list is defined by the **WBSPurpose** codelist.

Project Status

Specifies the current project status. This list is defined by the **WBSPStatus** codelist.

WBS Parent

Identifies the higher-level object that is associated with the WBS item that you are creating.

The WBS parent must be for a single project object or for another WBS object. You cannot change the parent after the WBS project has been created.

Name

Specifies a name for the project or renames it.

Correlation Status

Displays the correlation status assigned by the software. This value is read-only. The following table provides a description of the correlation statuses:

Status	Description
Correlated with data match	Represents objects that have a data match between the design basis data and the objects in the three-dimensional model.
Correlated with data mismatch	Represents objects that have a correlation with the design basis. However, these objects have a discrepancy, which generates the mismatch. The cause of the discrepancy can result from changes in the P&ID or the 3D model.
Correlated with approved data mismatch	Represents objects that have a correlation with the design basis. However, these objects have approved data discrepancies.
Correlated with approved topology mismatch	Represents objects that have a correlation with the design basis. However, these objects have approved topology discrepancy.
Not correlated yet	Objects that have either not been modeled from the P&ID or that have been modeled but have not been correlated with design basis data.
Ignored or not claimed (Project Management environment only)	Shows that the object either is not claimed (that is, it exists in the as-built condition), or that the software ignores the object (for example, revision clouds and labels).

Correlation Basis

Specifies if the object is correlated to a corresponding design basis. Select **Correlate Object** to associate the objects in three-dimensional model with the design basis. Select **No correlation is required** if the objects do not have a correlating design basis data.

Correlation Approval Status

Specifies if the component is approved with discrepancies in the three-dimensional data compared with design basis data. Select **Topology mismatch approved** if components topology mismatch can be ignored. Select **Data and Topology mismatches approved** if the components data and topology mismatches can be ignored. Select **None** if you do not want to approve a mismatch.

Create a New WBS Project

In this procedure, you are not retrieving projects in the project list, but you are creating a new project in the **Workspace Explorer**.

1. Set the filter to **All** in the **Locate Filter** box on the main toolbar.
2. In the **Workspace Explorer**, click the **WBS** tab.
3. Right-click the model folder at the top of the tree view, and select **Create WBS Project**.
4. On the **Create WBS Project** dialog box, select the appropriate options.

💡 TIPS

- The grid on this dialog box has two columns. The **Property** column identifies the properties for the project. The **Value** column either displays a value that you can review but cannot change, or a value that you can type or select from a list.
 - The **Name** cell is required. You cannot complete the command until you type a name.
 - You cannot edit the cells that have grey shading.
5. Click **OK**.

*The new project is added to the **WBS** tab of the **Workspace Explorer**.*

6. Add WBS items to the new project as needed. For more information, see *Create a New WBS Item* (on page 91).

📝 NOTES

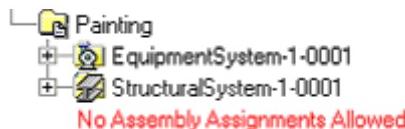
- You can create as many **WBS Project** type projects as necessary; however, only one **WBS As-Built** type project is allowed per model.
- You can delete a WBS object even if objects are related to it. However, the software deletes only the relationships, not the related objects.
- You can change a design object (that is, any object that supports the relationship to a project) from one project to another by selecting the project on the **WBS** tab and using the **WBS Project Edit** ribbon.

Assign to WBS

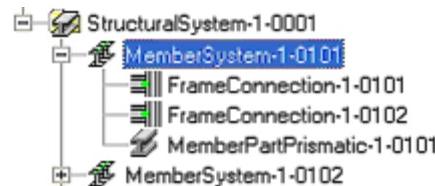
Creates a relationship in the database between each object in the select set and the selected Work Breakdown Structure (WBS) item in the **Workspace Explorer**. These relationships display on the **Relationships** tab of the object **Properties** dialog box.

WBS assignment is controlled by the software to enforce certain conditions. Rules for assignment to WBS items are defined by properties of the WBS item. For more information, see *General Tab (WBS Item Properties Dialog Box)* (on page 86). To support automatic assignments and updates, the **Assign to WBS** command uses the following rules:

- For a given WBS item with a specific type and purpose, you can assign all systems or all assemblies, but not a mixture of both. In the following example, because the first type of assignment under **Painting** is a system assignment, the **Assign to WBS** command only allows you to assign other systems (or individual objects) to the **Painting** WBS item.



- When you assign a system or an assembly to a WBS item, the **Assign to WBS** command automatically assigns all associated objects to the WBS item as well. For example, suppose you assign **MemberSystem-1-0101** to the **Painting** WBS item. The **Assign to WBS** command assigns **FrameConnection-1-0101**, **FrameConnection-1-0102**, and **MemberPartPrismatic-1-0101** to the **Painting** WBS item automatically.



- When you assign a higher-level system or an assembly object to a different WBS item, the **Assign to WBS** command prompts you to move the sub-objects to the new WBS item.

You can manually assign objects to WBS items after they have been created. You can determine which object classes are assigned during the manual assignment by editing the object class list in the **WBSAssignableNames_Manual.txt** file delivered in the **SharedContent** share. Only object classes in this file are assigned during the manual assignment. If the **WBSAssignableNames_Manual.txt** file is deleted, all selected objects are assigned to WBS.

You can also have the objects assigned automatically as you create them by setting the active WBS project or WBS item during modeling. If a WBS project is identified in the **Active Project** box on the main toolbar, all new objects are claimed to that active project when they are created. If a WBS item is identified, objects are first claimed to the parent project of the WBS item and then assigned to the WBS item. Only lowest-level objects, commonly termed as parts, are automatically assigned. For example, design objects like piping features or grouping objects like pipelines are not assigned, but piping parts are assigned. The automatic assignment of objects to WBS is controlled by the **WBSAssignableNames.txt** file located in the **SharedContent** share. You can modify the file to determine which object classes are automatically assigned.

■ NOTES

- The **Update WBS Assignments** command handles cases where you add new objects to a system or an assembly as part of the 3D modeling tasks, or when you move systems or modify the system hierarchy.
- The **Assign to WBS** command always checks to make sure that, at the time of assignment, a system or assembly and all sub-objects are valid for assignment.
- When assigning a pipe run to the WBS item, you must select the entire pipe run. Use the Locate Filter or **QuickPick** to help with selecting the entire pipe run.

See Also

[Assign Objects to a WBS Item \(on page 96\)](#)
[WBS Items and Projects \(on page 84\)](#)

Assign to WBS Dialog Box

Creates a relationship between the objects in the select set and the selected Work Breakdown System (WBS) item.

Look in

Specifies whether you want to look in the workspace or in the Model database for the WBS items.

See Also

[Assign to WBS \(on page 95\)](#)

Assign Objects to a WBS Item

1. Select the active WBS project in the **Active Project** box on the main toolbar.
! TIP If the appropriate WBS project does not appear in the list, click **More** to open the Select Active Project dialog box.
2. Select objects in the model by clicking in a graphic view, dragging a fence around objects, or selecting by filter.
! TIP When assigning a pipe run to the WBS item, you must select the entire pipe run. Use **QuickPick** to help with selecting the entire pipe run.
3. Click **Project > Assign to WBS**.
4. On the **Assign to WBS** dialog box, specify **Workspace** or **Database** to update the hierarchy of WBS items.
5. Select the WBS item to which you want the selected objects assigned.
6. Click **OK** to create the relationships between the objects in the select set and the selected WBS item.
7. Verify the relationship by selecting an object and doing one of the following:
 - Select an object and view the **Relationship** tab on its **Properties** dialog box.

- Select the WBS item in the **Workspace Explorer** and click  **Select objects to assign** on the **WBS Item Edit** ribbon. All of the associated objects highlight in the graphical view.
- Right-click the WBS item in the **Workspace Explorer** and click **Select Nested**. All of the associated objects highlight in the graphical view.

NOTES

- If no as-built project exists, then a message indicates that the command requires an as-built project. You can create an as-built project in the **Workspace Explorer** by setting **As-built** in the **Project Purpose** field. For more information, see *WBS Items and Projects* (on page 84).
- If some objects cannot be assigned because of assignment type problems, a message appears. Click **Yes** to continue with the valid objects.
- If some of the objects are not valid because they are assigned exclusively, a message appears. Click **Yes** to change the assignment of the highlighted objects.

See Also

Assign to WBS (on page 95)

Update WBS Assignments

Updates system and assembly Work Breakdown Structure (WBS) assignments.

Any given project could contain many different WBS items. Membership, for performance reasons, is not updated automatically as you add or remove objects from systems and assemblies as part of your 3D modeling tasks. The **Update WBS Assignments** command resolves system and assembly assignments whenever you require them to be updated.

For more information on assigning objects to WBS items, see *Assign to WBS* (on page 95).

See Also

Update WBS Assignments (on page 97)

Update WBS Assignments

1. Select one or more WBS items to update in the **Workspace Explorer**.

The WBS objects highlight in the select color.

2. Click **Project > Update WBS Assignments**.

All WBS assignments for the selected objects update.

NOTES

- If any of the objects have WBS assignment conflicts, then a confirmation message appears. In cases where one of the assignments requires exclusive membership, the command changes the object and its children to the more restrictive assignment. Click **Yes** to continue processing the update.
- If an object belongs to an assigned system or assembly object (or both), then the software assigns the object to the same WBS item as the owning object. Any nested objects are assigned.
- If an object belongs to more than one WBS item and one of the WBS items is set to exclusive, then the object is put on the **To Do List** in an error state to be resolved. You can modify the WBS item to clear assignments when there are conflicts.

Retrieving Data

When you retrieve documents in an integrated environment, you are retrieving the document data that was previously published. For example, in SmartPlant Instrumentation, you can retrieve engineering information from a published P&ID into the SmartPlant Instrumentation database.

To retrieve a document, you can use the **SmartPlant > Retrieve** command to open a dialog box that assists you in retrieving the applicable documents.

NOTE The **Retrieve** command is available only if you have registered the model using the Project Management task. For more information on registering, see the *Project Management User's Guide*. You must also install the **SmartPlant Client** and **SmartPlant Schema Component** to use the **Retrieve** command. For more information, see the *Intergraph Smart™ 3D Installation Guide* or the *Integration Reference Guide*.

When you use the **Retrieve** command, the software searches the integrated environment for documents to retrieve, and the **Retrieve** dialog box lists these documents.

You can retrieve a document in the following ways:

- **As published** - Retrieves only the data that the authoring tool originally published with the selected revision and version of the document. Retrieving as-published data retrieves the .XML file that the authoring tool published.
- **With the latest data** - Retrieves the latest data associated with the selected document. If another, more recently published document contains updates to objects in the selected document, then the software retrieves the most current data for those shared objects. When you retrieve the latest data, an .XML file containing the published data is generated.
- **CDW data** - Retrieves the data by updating the property values contained in a published XML with those contained on the corresponding CDW (consolidated warehouse) object.

In Smart 3D, the types of documents and data that you can retrieve include:

- P&IDs
- Project Breakdown documents
- Electrical
- Dimensional Datasheets (DDPs)
- Plant Breakdown Document

NOTE You must have write permissions to the model to use the **Retrieve** command.

Retrieving P&IDs

You can retrieve piping, instrumentation, and equipment data from a P&ID in an integrated environment.

To use a P&ID in Smart 3D, the piping designer should have defined specific properties on the objects in the P&ID. These properties include fluid code, tag sequence number, piping material class, and nominal piping diameter. In addition, the nozzles should be labeled on the P&ID.

NOTE You should retrieve the SmartPlant Instrumentation data before placing instrumentation in the model.

Retrieving Electrical Cable Schedules

You can retrieve electrical cable schedule data from SmartPlant Electrical (SPEL). In the Electrical task, the **SmartPlant > View Cable Schedule** command allows you to view the retrieved data and update or import cables.

Retrieving Instrumentation Datasheets

You can retrieve SmartPlant Instrumentation dimensional data for piping. The software retrieves instruments defined in SmartPlant Instrumentation and maps those instruments to a parametric symbol.

Smart 3D retrieves the non-graphical property values, such as instrument tag, manufacturer, and part number, as well as dimensional group data used to model the instrument.

NOTE You should retrieve the SmartPlant Instrumentation data before placing instrumentation in the model.

Plant Breakdown Structure (PBS)

You can retrieve the plant breakdown structure (PBS). The PBS is created in and published by SmartPlant Foundation and retrieved to provide information about the models, areas, and units that need to be created in the software.

The PBS document published by SmartPlant Foundation contains information about the physical model whose structure consists of plants, areas, and units. The default structure is plant/area/unit, but you can define a custom hierarchy in the Schema Editor.

For more information, see *Create a Custom PBS Hierarchy* (on page 50) in the *Integration Reference Guide*.

Data Handling After Retrieval

You can view P&IDs using the **SmartPlant > View P&ID** command to access the data and correlate objects. You can view retrieved electrical cable schedule data with the **SmartPlant > View Cable Schedule** command in the Electrical task.

Understanding the Design Basis

The 3D design basis is the set of objects in the model database which represent the data from documents previously retrieved from TEF. You do not directly create, edit, or delete these objects. When you correlate a 3D object, a relation is created between that 3D object and its correlated design basis object. For more information, see *Design Basis Explanation* (on page 12).

Objects that you retrieve can become the design basis for objects in downstream documents. Objects that become the design basis for other objects can be specific objects that get richer as they move through the lifecycle, or they can be schematic or logical objects in one application that evolve into more detailed objects downstream.

Design basis is implicitly based on retrieval; you do not have to define it. For example, a pump retrieved from a PFD becomes the design basis for a pump in the P&ID.

Retrieve and Restore

When another application has been restored to a previous state, the Smart 3D design basis objects are deleted and re-created upon retrieval. To avoid duplicating 3D objects, the retrieval

process checks systems, pipelines, and projects/contracts to see if they exist with the same name and type as design basis objects. If the objects do exist, then the software correlates to the objects upon retrieval instead of creating new objects.

After the retrieve operation, you must re-correlate the other 3D objects (besides systems, pipelines, and projects/contracts) with the new design basis objects.

See Also

[Retrieve Documents \(on page 102\)](#)

Retrieve Command

Provides a list of the published documents that are available for retrieval. This list is displayed on the **Retrieve** dialog box, from which you can select the documents that you want to retrieve, bringing the information from the integrated environment into Smart 3D.

NOTES

- The **Retrieve** command is available only if you have registered the model using the Project Management task. For more information on registering, see the *Project Management User's Guide*. You must also install the **SmartPlant Client** and **SmartPlant Schema Component** to use the **Retrieve** command. For more information, see the *Intergraph Smart™ 3D Installation Guide* and the *Integration Setup Guide*.
- The **Retrieve** command requires that you have write permissions to the model. Otherwise, error messages are displayed. For example, when you are retrieving the Plant Breakdown Structure (PBS), the command displays an error that says it is unable to create the Plant Breakdown Structure (PBS) systems when retrieving the PBS. For all errors, you have the option of continuing the retrieve process and cleaning up the design basis, or you can cancel the retrieve process and fix the permissions and status, then re-run the **Retrieve** command.

See Also

[Retrieving Data \(on page 98\)](#)

Retrieve Dialog Box

Allows you to retrieve information published by other authoring tools.

Plant Breakdown Structure

Displays the plant breakdown structure (PBS) hierarchy to retrieve the corresponding documents. Selecting a node displays the published documents related to that node in the Documents to retrieve section.

In the following examples, the PBS hierarchy is **Plant > Area > Unit**:

- Select a Plant node: All documents which have the relation with the PBS hierarchy (Area/Unit) as well as the documents which do not have relation with the PBS hierarchy (Area,/Unit) are listed in the Documents to retrieve section.
- Select an Area node that has multiple Units: All documents that correspond to the Units in that Area are listed in the Documents to retrieve section.
- Select a Unit node: All documents that correspond to that Unit are listed in the Documents to retrieve section.

NOTE You can expand or collapse the nodes by clicking the + and - icons.

Document type

Lists the types of documents that you can retrieve. Selecting a document type changes the list view to show only that document type.

Show

Indicates which documents you want to see in the list. Select from the following options:

New documents - Provides a list of only the new documents that have not yet been retrieved.

New versions of retrieved documents - Provides a list of only those documents that need to be retrieved. In other words, the list will display the documents that have newer versions published since they were last retrieved.

Unchanged documents - Provides a list of documents that have not changed from the previous retrieve.

Documents of all owning groups - Provides a list of documents associated with all owning groups. If an owning group is not configured to the user, the documents associated with it are disabled and cannot be retrieved.

Documents to retrieve

Displays a list of the documents available for retrieval. For each document, this list provides the name, type, PBS parent, revision and version numbers, status, date of the last retrieval, source, owning group, publish comment, publish date and retrieve option. Select the check box beside each document you want to retrieve and then use the Retrieve Option column to specify whether you want to retrieve the document **As published**, **Latest data** or retrieve it with the **CDW data**.

As Published - Retrieves only the data that the authoring tool originally published, along with the selected revision and version of the document at the time of publishing. This is the default option.

Latest data - Retrieves data by comparing the information in the database with what is in the XML file and will update only the objects that were originally published.

CDW data - Retrieves the data by updating the property values contained in a published XML with those contained on the corresponding CDW object.

TIP To quickly apply a Retrieve option to multiple documents, point to the cell that you want to select, then click and drag until all the documents are selected. Right-click on the highlighted cells and select Retrieve option to apply the **Latest data**, **As published** or **CDW data** option. Similarly, you can use the **Select to retrieve** option to select all or clear the selected documents to retrieve.

Select All

Selects all the files in the Documents to retrieve section.

Clear All

Clears any selected Documents to retrieve section.

Batch retrieve

Indicates that the system will retrieve the selected documents in batch mode, in other words, in the background. This feature is not available in the current version of the software.

NOTE Work Breakdown Structure (WBS) documents, such as the Plant Breakdown Structure (PBS) documents are considered administrative documents by the software and must

be retrieved by all tools that subscribed to these types of documents. So, even when these documents are new to the tools (have not been retrieved by the tool before), they are still listed in the **Documents to be retrieved only** list, because they must be retrieved.

See Also

[Retrieve Documents](#) (on page 102)

[Retrieving Data](#) (on page 98)

Retrieve Documents

1. Click **SmartPlant > Retrieve**. The **Retrieve** dialog box appears.

💡 TIPS

- This command is available only if you have registered the active model using the SmartPlant Registration Wizard. For more information, see the *Project Management User's Guide*. You must also install the **SmartPlant Client** and **SmartPlant Schema Component** to use the **Retrieve** command. For more information, see the *Intergraph Smart™ 3D Installation Guide* and the *Integration Setup Guide*.
- If you are logged on with a user name that is not defined in the integrated environment, you are prompted to log on when you use this command.
- The **Retrieve** command searches the SmartPlant Foundation model for documents that are ready to be retrieved. These documents appear in the **Documents to retrieve** list on the **Retrieve** dialog box.

2. In the **Document type** box, specify the type of document to be retrieved.
3. In the **Show** section, select the appropriate option:
 - **New documents** - Provides a list of only the new documents that have not yet been retrieved.
 - **New versions of retrieved documents** - Provides a list of latest versions of documents published since they were last retrieved.
 - **Unchanged documents** - Provides a list of documents that have not changed from the previous retrieve.
 - **Documents of all owning groups** - Provides a list of documents associated with all owning groups. If an owning group is not configured to the user, the documents associated with it are disabled and cannot be retrieved.

💡 TIP Select **Documents of all owning groups** option to list the documents associated with all owning groups. If you are configured to the owning group, the documents associated with it are disabled and cannot be retrieved.

4. In the **Documents to retrieve** list, select the check box beside each document that you want to retrieve. To help identify the documents, review the details in the **Type**, **Revision**, **Version**, and **Last Retrieved** columns.

💡 TIP To quickly select the entire list, click **Select All**. To quickly cancel the selections, click **Clear All**.

5. For each document that you checked, use the **Retrieve Option** column to specify whether you want to retrieve the document with the **Latest data**, **As published** or **CDW data**.

!TIPS

- Select **As Published** to retrieve only the data that the authoring tool originally published, along with the selected revision and version of the document at the time of publishing.
- Select **Latest Data** to retrieve data by comparing the information in the database with the published XML file and update the objects that were originally published.
- Select **CDW data** to retrieve the data by updating the property values contained in a published XML with those contained on the corresponding CDW object.

6. Click **OK** to retrieve the specified documents.

The software displays a message box you when the retrieval process is complete.

7. Click **View Log** to verify error or information messages

OR

Click **Close**.

!NOTE

- In the Project Management environment, the Deleted and Unclaimed Objects document is retrieved automatically every time you retrieve, if there is a newer version of this document since the last retrieval. The document is not included in the list, but it is retrieved automatically to ensure that the applicable information is updated.

P&ID Documents

After retrieving, you can use the **View P&ID** command and the **P&ID Viewer** to review data that requires attention. Any items that need to be addressed appear in green, red, and purple in the **P&ID Viewer**. For more information about colors, see *Set Correlation Status Colors Dialog Box* (on page 114).

You can use the **Compare Design Basis** command to see property differences. For example, if you have custom equipment in your model, you may need to modify select list values in the Custom Equipment reference data. You may have to perform routing tasks from the P&ID and place inline components and instruments. Refer to task-related documentation for assistance in correcting data from the P&ID.

To allow the placement of piping components from a retrieved P&ID, you must specify the value **SmartPlant 3D** for the **Use Piping Specification** property in SmartPlant P&ID Options Manager.

Electrical Documents

After retrieving, you can use the **View Cable Schedule** command to review and update the cables. For more information, see *View Cable Schedule*.

See Also

Retrieving Data (on page 98)

Creating a Plant Breakdown Structure without Retrieving a PBS Document

Retrieval of the plant break down structure (PBS) is not required in Smart 3D. You can configure plant objects directly in the 3D model without retrieving a PBS document. Directly configure plant objects through the **Workspace Explorer** or through the Systems and Specifications task in Smart 3D.

When you do not retrieve the PBS document from SmartPlant Foundation (SPF), create a PBS in the 3D model directly. Upon retrieval of the P&ID, the software creates a new system under the plant hierarchy with the name of the retrieved P&ID. All pipelines belonging to the retrieved P&ID are created under the new system. You can then move the pipelines to their needed locations within the existing plant hierarchy.

In subsequent retrievals, the software does not recreate these pipelines and allows you to view and propagate changes at the pipeline level using the **Compare Design Basis** dialog box. For more information, see *Compare Design Basis Command* (on page 134).

Retrieving Cable Data

In an integrated environment, the **Electrical** task and SmartPlant Electrical can share a cable schedule, along with several cable properties.

You can retrieve a cable schedule using the **SmartPlant > Retrieve** command. Then, you can view the schedule and create or update cable objects while in the Electrical task within Smart 3D.

If you want to create cables in a specific electrical system, then you should select the system in the Workspace Explorer before viewing the cable schedule. If you do not select an electrical system, then the software creates the cables in an electrical system with the same name as the cable schedule document. If no such system exists, then the software creates one.

Your project may contain pumps with integrated motors or separate motors. Both situations are handled in the software. When retrieving cable data, Smart 3D searches the cable schedule and displays the cable connection in the **To/From** field for the cable connection. If the pump does not appear in the cable schedule, then the pump is referenced. You can visually see what is being created with the cable in the **To/From** field. Upon finding one or the other, a cable is created and connected to the motor or the pump.

See Also

Import cables (on page 107)

View Cable Schedule

Displays retrieved cable schedules. You must retrieve cable schedules to view or create cables while in the Electrical task within Smart 3D. You can then update the cables. Use the **SmartPlant > Retrieve** command to retrieve electrical documents. This command is only available if you registered the active model with SmartPlant Foundation in the Project Management task. For more information on how to retrieve documents, see *Retrieve Documents* (on page 102).

See Also

Cable Schedule Documents Dialog Box (on page 105)

Cable Schedule Documents Dialog Box

Displays a list of retrieved cable schedules and their associated properties. Select a schedule, and then click **Open** to view the cables.

Name

Displays the name of the document.

Document Type

Displays the type of document.

Document Title

Displays the title of the document.

See Also

Cable Schedule Dialog Box (on page 105)

Cable Schedule Dialog Box

Displays a list of cables in a grid format.

View Cable Schedule Documents

Returns you to the **Cable Schedule Documents** dialog box. You can also press BACKSPACE.

Refresh

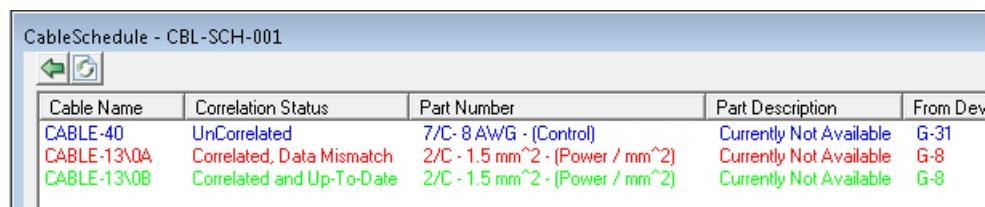
Updates the cable schedule. After modifying the cables in Smart 3D, click **Refresh** to reflect the changes in the cable schedule.

Cable Name

Displays the name of the cable as defined in the design basis data.

Correlation Status

Displays the correlations status of the cable design basis data with corresponding 3D model data. The colors identify the correlation status of each cable in the model and the design basis object that corresponds to it.



Cable Name	Correlation Status	Part Number	Part Description	From Dev
CABLE-40	UnCorrelated	7/C - 8 AWG - [Control]	Currently Not Available	G-31
CABLE-13\0A	Correlated, Data Mismatch	2/C - 1.5 mm^2 - [Power / mm^2]	Currently Not Available	G-8
CABLE-13\0B	Correlated and Up-To-Date	2/C - 1.5 mm^2 - [Power / mm^2]	Currently Not Available	G-8

Default Color	Status	Description
	Correlated and up-to-date	The cable in the design basis has a match in the 3D model without any discrepancies in the cable data, and the data is up-to-date.
	Correlated, Data Mismatch	The cable in the design basis has a match in the 3D model. However, there are discrepancies in the cable data.
	Uncorrelated	The cable in the design basis does not exist in the 3D model, or is unknown.
	Ignored	The cable metadata in the design basis is ignored.

Part Number

Displays the part number for the cable as defined in the design basis data.

Part Description

Displays the short description of the cable part as defined in the design basis data.

From Device

Displays the cable originating equipment code as defined in the design basis data.

To Device

Displays the cable terminating equipment code as defined in the design basis data.

Signal Type

Displays the type of signal the cable will carry as defined in the design basis data.

Validation Status

Displays the validation status of the selected cable. The following are the available validation statuses:

Not Validated - Specifies that the cable is not validated. This is the default status.

Invalid - Specifies that the cable is missing a **Part Number**, **From Device**, or **To Device** data in 3D model. The missing value is highlighted in bold.

Valid - Specifies that the design basis cable has **Part Number**, **From Device**, and **To Device** data in 3D model.

Validate

Verifies if the selected cable has **Part Number**, **From Device**, and **To Device** data available in the 3D model.

Process

Imports or updates the selected cables. When you process the cables, the software creates the cables in 3D model and correlates with corresponding cable design basis data.

View Log

Displays a **CreateEFCables.log** file. The file contains information about successfully processed cables, and the cables that could not be processed due to data inconsistencies.

Include up-to-date cables

Appends Correlated and up-to-date cables to the current cable schedule.

Select All

Selects all the cables in the list.

Select Valid Cables

Selects all uncorrelated valid cables in the list.

See Also

Import cables (on page 107)

Cable Schedule Documents Dialog Box (on page 105)

Import cables

★IMPORTANT

- You must retrieve at least one cable schedule to view the cable schedule. Use the **SmartPlant > Retrieve** command. This command is available only if you have registered the active model with SmartPlant Foundation in the Project Management. For more information on how to retrieve documents, see [in the Common User's Guide](#).
- Before viewing the cable schedule, select an appropriate electrical system in the **Workspace Explorer** to create cables. Smart 3D creates the cables with the same name as in the cable schedule document. If you do not select an electrical system, then Smart 3D creates a new system with the same name as the cable schedule document, and then creates cables under the new system.
- Set the **Active Permission Group** to **Electrical** and assign the objects that you place in the model to the Active Permission Group.

1. Click **SmartPlant > View Cable Schedule**.
2. On the **Cable Schedule Documents** dialog box, select a cable schedule, and click **Open**.
3. On the **Cable Schedule** dialog box, set the **Include up-to-date cables** option as necessary.

!TIP **Include up-to-date cables** option allows you to hide the cables that are already processed and up-to-date.

4. Select cables in the grid.
!TIP You can click **Select All**, or use the CTRL or SHIFT keys to select multiple cables.
5. Click **Validate** to verify if the **Part Number**, **From Device** and **To Device** exist in 3D model data.
The selected cable is validated, and its validation status is updated. Any missing data is highlighted in bold text.
6. Select the validated cable, and then click **Process**.

 **NOTE** For a cable to successfully process, its design basis data displayed on the list must match with corresponding 3D model data.

TIPS

- When you select a cable on the **Cable Schedule** dialog box, the corresponding cable is automatically selected in the **Workspace Explorer**.
- You can **Autoroute** , or **Delete**  a processed cable without exiting the **Cable Schedule** dialog box.
- Click **View Cable Schedule Documents**  to return to the cable schedule documents list.

See Also

Cable Schedule Documents Dialog Box (on page 105)

Cable Schedule Dialog Box (on page 105)

Viewing P&IDs

The **SmartPlant > View P&ID** command allows you to display a P&ID that has been retrieved into the model.

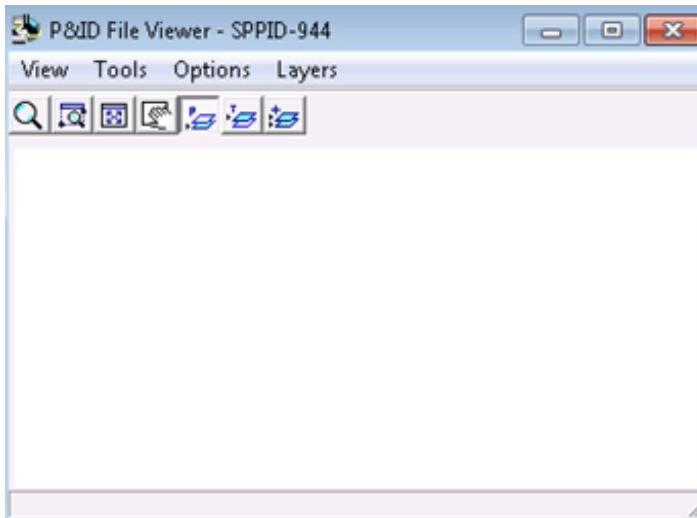
Using a P&ID from the two-dimensional (2D) environment within the three-dimensional (3D) environment is an example of the integration of disciplines. Beyond the display functionality, the software allows you, the designer, to retrieve objects that correlate between the P&ID and the model. This process helps you to create the appropriate 3D design objects.

The P&ID objects you can select and place in the 3D model include pipe runs, equipment, piping components, cables, and instrument components. You can assign 3D objects to Work Breakdown Structure (WBS) projects and later change the assignments to different projects.

In the Piping task, the **Route Pipe** command includes the option **Select from P&ID** to graphically select a run from a P&ID to route. You must set the **Locate Filter** box to **All** or **Pipe Run** before selecting a run from a P&ID. When you select a run on a P&ID, the software checks to see if the run already exists in the model. If the run does exist and is correlated, then the software locates the existing run in the model from the correlated run on the selected P&ID. If the run does not exist, then the **Create New Run** dialog appears, allowing you to create the new run. For most components, you can add them during routing or after routing is complete. Some components, like reducers, must be inserted during routing.

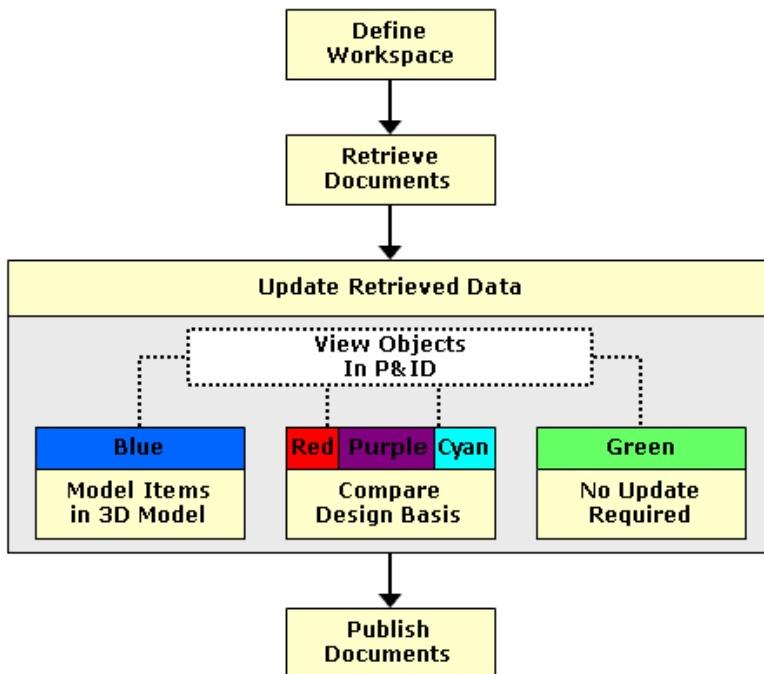
The Equipment and Furnishings task also provides commands that work with placing objects from a P&ID. These commands include the **Place Equipment**, **Place Equipment Component**, **Place Designed Equipment**, **Place Designed Equipment Component**, **Place Shape**, and **Place Nozzle** commands.

A picture of the **P&ID File Viewer** window appears below. You can resize the window with standard Windows commands on the title bar, like **Minimize**, **Expand**, and **Close**. The window has its own toolbar with viewing commands, such as **Zoom Tool**, **Window Area**, **Fit**, and **Pan**.



The colors of various objects in a P&ID reflect the correlation status between the P&ID and the 3D model. You can consider this a graphical **To Do List** that helps you identify additional work after using the **Retrieve** command. Use the **P&ID Viewer** in conjunction with the **Compare Design Basis** command to see property differences. You can specify the colors using **Options > Set Correlation Status Colors** in the **P&ID File Viewer** menu bar.

The **Select Correlated** command on the **P&ID File Viewer Tools** menu selects 3D objects that match with objects in the P&ID. You can select objects with data match, data mismatch, topology mismatch, and unknown data match. You can also select correlated objects in as-built. The objects must satisfy the parameters of the active locate filter. When you complete a **Select Correlated** command, the software highlights the objects in the 3D view and places them in the select set.



Handling Deleted Design Basis Issues

Items deleted from the P&ID can be found in the 3D model by updating the objects using the **Compare Design Basis** dialog box or by specifying a filter to select the deleted objects. Any design basis objects that compare with a status of correlated design basis deleted will be deleted when you click **Update** on that dialog box.

You can also use **Fence Select** to update large amounts of data. You set the Select filter to **All**, fence the design objects to update, and then run the **Compare Design Basis** command.

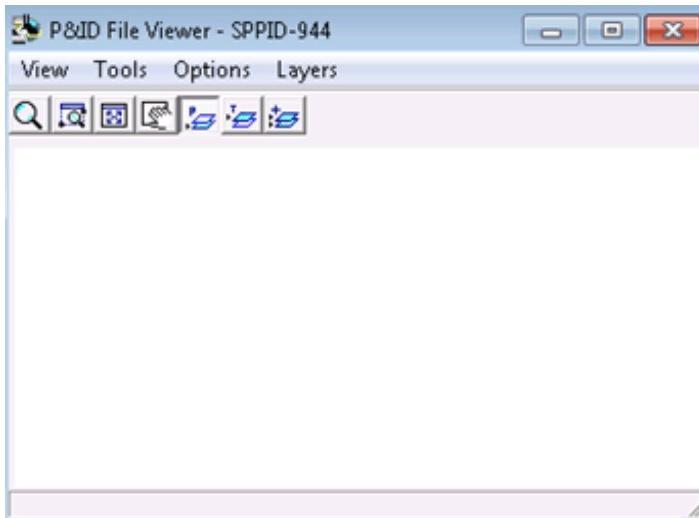
View P&ID Command

Displays a P&ID that corresponds to the design basis. You can choose the P&ID from a list of P&IDs that have been retrieved.

All P&IDs that have been retrieved into the model appear in this list. If no P&IDs have been retrieved, then this list is empty.

When you select a drawing and click **OK**, the P&ID opens in the **P&ID File Viewer** window.

The software displays the P&ID in the same location and at the same size from the last time that it was displayed in the workspace. You can resize the view with the standard Windows commands on the title bar, like **Minimize**, **Maximize**, and **Cancel**. A toolbar offers view commands, like **Zoom Out**, **Zoom Area**, **Fit**, and **Pan**. Menus allow you to select correlated objects and specify P&ID colors.



You can use the P&ID to access items, such as equipment, piping information, and SmartPlant Instrumentation dimension data, to help create the appropriate 3D design objects. Also, you can select a correlated object within the model and display the P&ID from which the object was drawn. You can do this by selecting the object in the model and then selecting the **Smart 3D > View P&ID** command. This opens the drawing in which the correlated object exists. If the correlated objects span multiple P&IDs (such as a split equipment), then the software displays a list of P&IDs that you can choose from.

If there is a problem displaying a P&ID or selecting objects on the P&ID, you can consider running a custom command for troubleshooting purposes (this command does not resolve any errors). The ProgID for this command is SP3DDisplayPIDService.VerifyPIDCmd. For more information, see Verify P&ID Integrity Command.

See Also

Viewing P&IDs (on page 109)

View P&ID Dialog Box

Opens the file that serves as the design basis. All P&IDs that have been retrieved appear in this list. If no P&IDs have been retrieved, then this list is empty. You can sort the list based on any column by clicking a column heading. You can select only one drawing at a time.

This dialog box appears after you select the **SmartPlant > View P&ID** command. When you select a drawing and click **OK**, the P&ID opens in the **P&ID File Viewer** window.

Drawing Number

Provides the number of the available design basis document.

Title

Identifies the title of the available design basis document.

Revision

Indicates the revision number of the document.

Version Date

Indicates the revision date of the document.

See Also

Correlate Model Objects with Design Basis Objects (on page 121)

P&ID File Viewer

Displays the P&ID you selected. This window is associated with the **SmartPlant > View P&ID** command.

Toolbar

Zoom Tool

Decreases the display size of selected objects.

Window Area

Magnifies an area of the model. Drag or click two points to create a fence around an object or area of the model that you want to enlarge.

Fit

Fits all visible objects in the active view.

Pan

Moves the view up, down, left, or right to display other areas of the model. The pointer appears as a hand when this command is active.

Show Primary View

Displays the primary components only for the P&ID.

Show Typicals View

Displays the typicals components only for the P&ID.



Show Primary and Typicals

Displays both the primary and typicals components only for the P&ID.

View Menu

This menu contains the **Fit**, **Zoom In**, **Zoom Out**, **Zoom Area**, and **Pan** commands to assist in orienting the P&ID view.

Tools Menu

Magnify

Displays a small zoomed-in view of a portion of the P&ID.

Overview

Displays a small view of the entire P&ID.

Select Correlated

Selects the 3D objects that are correlated to the design basis objects. The selection of objects is based on the locate filter that is currently specified. The **Select Correlated** command highlights the correlated objects in the model and provides a way to quickly see areas where you need to do more work, such as highlighting all objects that have **Data - mismatch**.

NOTE Some of these objects may not have corresponding objects on the P&ID (for example, the pipeline object). These commands also select objects regardless of whether the objects are loaded in the current workspace or not. It will not change the workspace definition. These objects can then be manipulated by commands. If they do not match the workspace filter, then they will be removed from the workspace on the next workspace refresh.

The **Select Correlated** command includes the following options: **Correlated - data match**, **Correlated - data mismatch**, **Correlated - topology mismatch**, **Correlated - that are in as-built**, **Approved - topology mismatch**, and **Approved - all mismatches**. For more information about the first three options, see *Set Correlation Status Colors Dialog Box* (on page 114). The **Correlated - that are in as-built** option selects objects in the 3D model that are related to as-built and also are on the currently active P&ID.

Options Menu

Set Correlation Status Colors

Specifies the colors of various objects in the P&ID. The colors reflect the correlation status between P&ID objects and the corresponding objects in the 3D model.

Set Highlight Color

Sets the color of highlighted objects on the P&ID Viewer.

Set Select Set Color

Sets the color of selected objects on the P&ID Viewer.

Layer Controls Menu

Show Typicals

Displays the typicals components in the P&ID File Viewer.

Hide Primary

Removes the primary components from the P&ID File Viewer. This command appears if the Show Primary command is selected.

Swap on Highlight

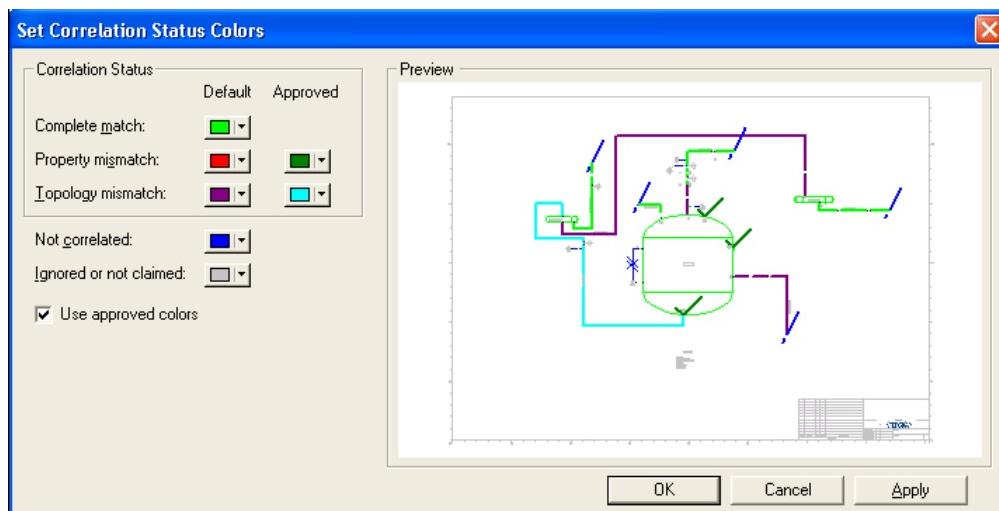
Displays either the primary or typicals components when a correlated 3D object is selected in the model. For example, if the typicals components are hidden and you select a 3D object that is correlated to a typicals object, then the typicals components are displayed and the primary components are removed from the view.

See Also

Display a P&ID and Retrieve Drawing Data (on page 115)

Set Correlation Status Colors Dialog Box

Specifies the colors that designate correlation status of objects in the design basis with objects in the three-dimensional model. You also specify the standard color for objects in the P&ID that do not have a correlation with any model object.



Correlated / Complete Match

Designates the color of the objects in the design basis that have a match in the model without any discrepancies in the data or topology. The default color is █.

Correlated / Property Match / Topology Mismatch

Designates the color of the objects in the design basis that have a match in the model without any discrepancies in the data, but have discrepancies in topology. The default color is █.

Correlated / Property Mismatch

Designates the color of objects in the design basis that have a match in the model. However, problems exist between the data associated with the design basis (for example,

the P&ID object) and model object. The default color is .

Correlated/ Property and Topology Mismatch Approved

Designates the color of objects in the design basis that you have compared or checked against the current design basis and approved the discrepancies in the data and topology. The default color is .

Correlated / Topology Mismatch Approved

Designates the color of objects in the design basis that you have compared or checked against the current design basis and approved the discrepancies in topology. The default color is .

Not correlated

Designates the color of objects in the design basis that do not have a match or do not exist in the model (have not been modeled yet). The default color is .

Ignored or not claimed

Designates the color of objects in the design basis that you have drawn but cannot have correlation because you have not placed the objects in the model. **Ignored** applies to things such as labels within the design basis. **Not claimed** applies to items that were not claimed on the P&ID during the Project operation. The default color is .

Use approved colors

Reveals the designated color of approved objects. For example, if you check this option, the color of the object with approved topology mismatch turns to  from . This option is useful in identifying and verifying the approved mismatches in the design basis.

Preview

Provides a window that shows the representative colors you selected to identify the correlation status.

See Also

Display a P&ID and Retrieve Drawing Data (on page 115)

Display a P&ID and Retrieve Drawing Data

1. Select an object in the model.
2. Click **SmartPlant > View P&ID**.
3. If the active object in the model has a match (or a correlated object) in only one P&ID, then the software automatically opens the associated P&ID. If the active object does not match, or has multiple matches in more than one P&ID, then the **Open P&ID File** dialog box opens listing the P&IDs that contain the matching object and allowing you to specify the drawing to open.

 **TIP** Use the document revision number and last revision date to select the correct document.

4. If the **Open P&ID File** dialog box opens, select the P&ID you want to access from the list of all P&IDs that have been imported. The **P&ID File Viewer: [drawing name]** window opens and displays the drawing.

 **TIP** The grid on the **P&ID File Viewer: [drawing name]** window states the name and description of the P&ID.

5. When the P&ID opens in the **P&ID File Viewer: [drawing name]** window, use the various commands in the P&ID File Viewer to orient the drawing, select correlated objects, and specify colors.
6. Select objects in the P&ID and use commands in the 3D software to create or edit these objects in the model.
7. To close the **P&ID File Viewer: [drawing name]** window, click **Close** on the title bar.
8. To open a different drawing, start the **SmartPlant > View P&ID** command again.

NOTES

- You can use the P&ID that the software displays in the **P&ID File Viewer** window as a reference when you model objects and thus create the appropriate 3D design objects.
- Among P&ID objects that you can select are a pipe run, equipment, cable, piping component, instrument component, branch point, and an attribute break point. Piping components and instrument components result in along-leg features in the 3D model. A branch point results in a branch feature in 3D, and an attribute break point results in a run change feature in 3D.
- If there is a problem displaying a P&ID or selecting objects on the P&ID, then you can consider running a custom command for troubleshooting purposes (this command does not resolve any errors). The ProgID for this command is SP3DDisplayPIDService.VerifyPIDCmd.

Viewing and Correlating P&ID Typicals

In Smart 3D, you can now view a P&ID's typicals and correlate these with your model. Within a P&ID drawing, typicals are user defined, graphical representation, of a group of objects and their relationships. On a P&ID drawing, typicals mark the position of where similar groups of objects should appear but have been hidden from view. For example, on a drawing typicals that contain a series of pipes, a pump, and valves, informs the viewer that at this position on the drawing there is more than one group of objects that consist of a series of pipes, a pump, and valves, but have been hidden from view to make the reading of the drawing clearer.

By default, typicals are hidden when you view the P&ID using the **View P&ID** command. To know exactly what the hidden objects are the viewer needs to switch views, from the primary view to the typicals view. **Layer Control** commands allow you to switch show and hide typicals, show and hide primary, and switch between primary and typicals views when a 3D object is highlighted.

View and Correlate P&ID Typical

1. Click **SmartPlant > View P&ID**.
2. Select a P&ID from the drawing list in the **Open P&ID File** dialog box. By default, the viewer opens displaying primary P&ID components.
3. Click  to view the primary components.
4. Click  to select the typicals view.
5. To display both primary and typicals, click .

 **NOTE** You can use the **Layer Control** commands to show and hide the P&ID's primary or typicals components.

6. To automatically switch between displaying primary and typicals components when a 3D object is selected, click **Layer Control > Swap on Highlight**. If both the primary and typicals views are displayed, then no switching between views occurs.
NOTE Using the **Piping** control on the main ribbon, select **All** before selecting the 3D Objects
7. To correlate, see *Correlate with Design Basis Command* (on page 118) or *Correlate Automatically Command* (on page 125).

Assign Colors for Correlation

1. Click **Smart 3D > View P&ID**. If an active (or selected) object in the model has a design basis match (or a correlated object) in only one P&ID, then the software automatically opens the associated P&ID. If the active object does not match or has multiple matches in more than one P&ID, then the **Open P&ID View** dialog box opens with the list of P&IDs with a match for that object.
2. When the **Open P&ID View** dialog box opens, select the P&ID you want to access from the list of all imported P&IDs. The **P&ID File Viewer: [drawing name]** window opens and displays the drawing.
3. On the **P&ID File Viewer: [drawing name]** window, click **Options > Set Correlation Status Colors**.
4. On the **Set Correlation Status Colors** dialog box, select a color for specifying objects with correlation and without any errors in the **Correlation Status section, complete** match box.
5. Select a color for specifying objects with correlation but have property inconsistencies in the **Correlation Status section, Property mismatch** box.
6. Select a color for objects you have approved with data mismatches in the **Correlation Status section, approved property mismatch** box.
7. Select a color for object you have approved with association problems in the **Correlation Status section, Topology mismatch** box.
8. Select a color for objects you have approved with topology mismatches in the **Correlation Status section, approved topology mismatch** box.
9. Select a color for objects that cannot be correlated.
10. Select a color for specifying objects that have not been drawn or are drawn in the model but not correlated in the **Not Correlated** box.

NOTE You can review the selected colors in the **Preview** area by clicking **Apply**.

See Also

[Viewing P&IDs](#) (on page 109)

Correlate with Design Basis Command

Specifies an object in the three-dimensional model and an object in a P&ID to correlate. A P&ID pipe run can correlate with multiple Smart 3D pipe runs. A P&ID pipeline can correlate with multiple Smart 3D pipelines.

If the objects do not have a status of **Correlated with data match**, you can trace the origin of the problem using the **Compare Design Basis** dialog box.

You can add conditions to the *[Reference Data Folder]\SharedContent\Xml\ExemptCorrelateClasses.xml* file that cause the Correlation Basis of an object to be set to **Ignored** when that object meets the conditions. The data in the `<IgnoreObjects>` xml tag is used to list conditions to determine if an object should be ignored for a P&ID topology comparison. Valid values for the Operator attribute in the `<Condition>` tag are `=` for equality and `!=` for inequality. For example:

```
<IgnoreObjects>
  <Condition>
    <Property Interface = "IJRtePipePathFeat"
      Name = "Type" Value = "Nipple" Operator = "=" />
  </Condition>
</IgnoreObjects>
```

You can change the correlation colors by clicking **Tools > Set Correlation Status Colors** in the **P&ID File Viewer**.

Default Color	Status	Description
	Complete match	Represents objects that have a data and topology match between the design basis data and the objects in the three-dimensional model.
	Correlated with property mismatch	Represents objects that have a correlation with the design basis. However, these objects have a property discrepancy which generates the mismatch. The cause of the discrepancy can result from changes in the P&ID or in the three-dimensional model.
	Correlated with Topology mismatch	Represents objects that have a correlation with the design basis. However, these objects have a topology discrepancy which generates the mismatch.
	Correlated with approved property mismatch	Represents objects that have a correlation with the design basis. However, these objects have approved property discrepancies.
	Correlated with approved topology mismatch	Represents objects that have a correlation with the design basis. However, these objects have an approved topology discrepancies.

Default Color	Status	Description
	Not correlated yet	Objects that have either not been modeled from the P&ID or that have been modeled but have not been correlated with design basis data.
	Ignored or not claimed	Shows the object either is not claimed (that is, it exists in the as-built condition), or the software ignores the object (for example, revision clouds and labels).

See Also

[Retrieving Data \(on page 98\)](#)

Correlate with Design Basis Dialog Box

Correlates the selected object in the 3D model to a matching design object on the P&ID. If the objects do not have a status of **Correlated complete match**, you can trace the origin of the problem using the **Compare Design Basis** dialog box.

See Also

[Correlate with Design Basis Command \(on page 118\)](#)

[Correlate Model Objects with Design Basis Objects \(on page 121\)](#)

[Properties Tab \(Correlate with Design Basis Dialog Box\) \(on page 119\)](#)

[Topology Tab \(Correlate with Design Basis Dialog Box\) \(on page 120\)](#)

Properties Tab (Correlate with Design Basis Dialog Box)

Selected

Specifies the name of the selected object in the 3D model.

NOTE A P&ID pipe run can correlate with multiple Smart 3D pipe runs. A P&ID pipeline can correlate with multiple Smart 3D pipelines. The **Selected** drop-down lists all objects in the 3D model that are correlated with the design basis object.

Category

Specifies the category for the property. Properties are listed in alphabetical order according to the interface of the category that you selected for the property pages of the 3D model.

The read-only field beside the **Category** box provides the following information about the correlation for the object that you selected in the 3D model:

- **Property Match** - Indicates that the object that you selected in the model has all properties matching those of its correlated design basis object.
- **Property Mismatch** - Indicates that the object that you selected in the model has one or more properties with values not matching the value of the mapped property in the correlated object.
- The check box beside the **Model Property Name** allows you to selectively update the properties in the list. You must select **Copy properties from design basis** to enable the selective update check boxes.
 - - Indicates clear or disabled state. Selective update is disabled or none of the properties are selected for update.

- - Indicates that all the properties in the list are selected for update.
- - Indicates that one or more properties in the list are not selected for update.
- - Indicates read-only. You cannot update this property.

NOTES

- You must check the selective update check box of the corresponding property to set its correlation status to **Property Match**.
- The software remembers the last saved selective update preference for an object type such as a pipe run, equipment, and pipeline system. For example, if you do not want to update **Name** for piperun1, clear the checkbox corresponding to **Name**, and then click **Update**. When you correlate piperun2, the dialog box displays your preference from the piperun1 you last correlated.

Model Property Name

Specifies the name of the property for the model object.

Design Basis Value

Specifies the value of the property for the design basis object.

Model Value

Specifies the value of the property for the 3D model object.

Copy properties from design basis

Controls copying of properties from the design basis object to the 3D model object. Select this option to update 3D object properties during manual correlation. Unchecking this option clears and disables all the selective update check boxes.

NOTE This option allows you to update the approval status of a property without updating it in **Compare Design Basis** dialog box.

Update

Correlates the 3D object with design basis object; if the **Copy properties from design basis** option is selected, transfers data from the design basis object (in the P&ID, for example) to match the 3D model object. Clicking **Update** changes all of the property values.

Close

Closes the **Correlate with Design Basis** dialog box.

Topology Tab (Correlate with Design Basis Dialog Box)

Displays the child objects of the selected grouping object and indicates both the 3D objects not correlated to the P&ID (design basis) and also the P&ID objects (design basis) not correlated to 3D objects. For example, when you select a pipe run, the **Topology** tab indicates objects that are correlated and in the same order on the pipe run, as well as objects that are correlated and not in the same order on the pipe run.

NOTE This tab is available only for those objects that support correlation and get topology from the design basis.

Selected

Displays the name of the selected object in the 3D model.

The read-only field provides the following information about the correlation for the object you selected in the 3D model:

- **Topology Match** - Indicates that the object in the model you selected has a match or correlation with an object in the design basis.
- **Topology Mismatch** - Indicates that the object in the model you selected does not have a match or correlation with an object in the design basis.

#

Indicates an index number to reference the object as defined in the design basis (that is, the drawing).

Design Basis Name

States the name of the object in the design basis (for example, a pipe run).

Model Name

States the name of the object in the 3D model.

Select

Selects a row in the grid. The object highlights in the model.

Close

Closes the **Compare with Design Basis** dialog box.

NOTE If a discrepancy exists on the **Topology** tab after clicking **Update** on the **Properties** tab, you can trace the discrepancy and attempt to resolve it. For example, a discrepancy might be an object routed or placed out of order.

See Also

Compare Design Basis with the Model (on page 137)

Compare with Design Basis Dialog Box (on page 135)

Correlate Model Objects with Design Basis Objects

NOTE A P&ID pipe run can correlate with multiple Smart 3D pipe runs. A P&ID pipeline can correlate with multiple Smart 3D pipelines.

1. Click **SmartPlant > Retrieve** to retrieve data into the software (for example, a P&ID or a Dimensional Datasheet).
2. Click **SmartPlant > Correlate with Design Basis**.
3. Select an object in the 3D model that you want to correlate. If you do not have a P&ID open, the software displays the **Open P&ID** dialog box.
- NOTE** If you are correlating pipelines, ensure to set the filter to **Pipelines**; likewise, for pipe runs, set the filter to **Piping Runs**. This is because you cannot select pipelines in P&ID and the software uses the filter to determine what kind of piping objects you are correlating.
4. Select the P&ID to display.
5. In the **P&ID File Viewer**, select the object that you want to correlate. The software then displays the **Correlate with Design Basis** dialog box. If one of the following conditions exist, then a message first displays.

- a. The 3D object supports one-to-many correlation, and the P&ID object is already correlated to one or more 3D objects. The following message displays:

Selected Design Basis object is already correlated to another 3D object. Are you sure you want to correlate more than one 3D object the same Design Basis object?

Click **Yes** to continue.

-OR-

Click **No** to display the **Compare Design Basis** dialog box, and proceed to step 6.

-OR-

Click **Cancel** to exit and cancel the correlation.
- b. The 3D object does not support one-to-many correlation, and the corresponding P&ID object and 3D object correlation already exists. The following message is displayed:

You are trying to correlate to the same object again.

Click **Ok** to display the **Compare Design Basis** dialog box with the correlation objects highlighted. Proceed to step 6.

-OR-

Click **Cancel** to exit and cancel the correlation.
- c. The 3D object does not support one-to-many correlation, and the corresponding P&ID or 3D object are already correlated. The following message displays:

You are trying to correlate to an object that is already correlated. Would you like to remove the existing correlation and correlate again?

Click **Yes** to remove the existing correlation and correlate the selected objects. After the new correlation, the software displays the **Compare Design Basis** dialog box with the newly correlated objects highlighted. Proceed to step 6.

-OR-

Click **No** to display the **Compare Design Basis** dialog basis with the correlated objects. Proceed to step 6.

-OR-

Click **Cancel** to exit and cancel the correlation.

6. Review the **Properties** tab for highlighted objects that have a discrepancy between the P&ID and the 3D model. Objects that do not match are displayed in a different background color.
7. Review the **Topology** tab to understand the differences in shapes between the 3D model and the design basis.
8. Select **Copy properties from design basis** if you want to update the 3D object properties. Clear this option to prevent overwriting the 3D object properties from design basis.
9. Click **Update** to correlate the 3D object with design basis object.

NOTE You can also select the **Correlate with Design Basis** command after activating a model object, a design basis object, or both types of objects. If you select an object before starting the command, follow the prompts on the status bar at the lower left of the application window.

Manually Correlate Multiple Smart 3D Pipe Runs/Pipelines with a P&ID Pipe Run/Pipeline

If a P&ID pipe run or pipeline is split into multiple pipe runs or pipelines in Smart 3D, you can use the following procedure to manually correlate these multiple Smart 3D piping objects to the single P&ID pipe run or pipeline.

NOTE If you are correlating pipelines, ensure to set the filter to **Pipelines**; likewise, for pipe runs, set the filter to **Piping Runs**. This is because you cannot select pipelines in P&ID and the software uses the filter to determine what kind of piping objects you are correlating.

1. Click **SmartPlant > Retrieve** to retrieve P&ID data into the software.
2. Open the P&ID in the **P&ID File Viewer**.
3. Click **SmartPlant > Correlate with Design Basis**.
4. Select an object in the 3D model that you want to correlate.
5. In the **P&ID File Viewer**, select the object that you want to correlate.

The software detects whether the P&ID object is already correlated to one or more 3D object. When you see the following message, click **Yes** to continue.

Selected Design Basis object is already correlated to another 3D object. Are you sure you want to correlate more than one 3D object the same Design Basis object?

NOTE If you click **No**, the software un-correlates the existing correlated run, and then correlates the new run.

6. Review the **Correlate with Design Basis** dialog box, set correlating options as needed, and click **Update**. For more information, see *Correlate with Design Basis Dialog Box* (on page 119).
7. Review discrepancies between the Smart 3D piping object and the design basis using the **SmartPlant > Compare Design Basis** command.

TIP The **Compare Design Basis** command helps you to determine if there are missing correlations to the P&ID piping object. For more information, see *Compare Design Basis with the Model* (on page 137).

8. Repeat steps 3 through 6 to correlate more Smart 3D objects to the P&ID piping object. When all related objects in the 3D model are correlated with the P&ID piping object, the **Correlation Status** property of these 3D objects shows **Correlated with data consistency**.

Create a Filter to Select Piping Components Based on Correlation Status

1. Click **Tools > Select by Filter**.
2. On the **Select Filter** dialog box, click **New Filter (Simple or Asking)** .
3. On the **New Filter Properties** dialog box, select the **Properties** tab.
4. Select **More** in the **Property** box.
5. Select **Pipe Nozzle** as the object type.

6. Select **Direct Property of Object Type** as the relationship.
7. Select **Standard** as the category.
8. Select the **Correlation Status** attribute, and click **OK**.
9. On the **New Filter Properties** dialog box, select an operator and a value. For example, you can specify that the filter select piping components with a correlation status equal to **Correlated with Data Consistency**.

NOTES

- The filter capability provides a means to query all piping objects based on their correlation status with one operation.
- In addition to the filter for piping components, you can create a filter to select all pipes with a specific correlation status. For more information, see *Create a Filter to Select Pipes Based on Correlation Status* (on page 124).

Create a Filter to Select Pipes Based on Correlation Status

1. Click **Tools > Select by Filter**.
2. On the **Select Filter** dialog box, click **New Filter (Simple or Asking)** .
3. On the **New Filter Properties** dialog box, select the **Properties** tab.
4. Select **More** in the **Property** box.
5. Select **Piping** as the object type.
6. Select **Run to Part-Owner** as the relationship.
7. Select **Piping Runs** as the related object type.
8. Select **Standard** as the category.
9. Select the **Correlation Status** attribute, and click **OK**.
10. On the **New Filter Properties** dialog box, select an operator and a value. For example, you can specify that the filter select piping components with a correlation status equal to **Correlated with Data Consistency**.

NOTES

- The filter capability provides a means to query all piping objects based on their correlation status with one operation.
- In addition to the filter for pipes, you can create a filter to select all piping components with a specific correlation status. For more information, see *Create a Filter to Select Piping Components Based on Correlation Status* (on page 123).

Correlate Automatically Command

Automatically correlates 3D objects with the design basis objects on the P&IDs based on the matching properties and topology.

There are several reasons why the data in the 3D model might be current than the data in the P&ID. For example, the model might exist before the P&ID, and you now want to correlate the existing model data to the P&ID data that you have retrieved.

NOTES

- If no 3D objects are selected, then the command runs the correlations for all selected P&ID drawings against all 3D objects in the workspace.
- Nozzles are correlated automatically when the parent equipment is correlated.
- You can correlate one P&ID pipeline to many 3D pipelines. You can also correlate one P&ID pipe run to many 3D pipe runs.

See Also

Auto-Correlation (on page 125)

Auto-correlation

How Auto-Correlation Works

The software correlates design basis data and Smart 3D objects based on auto-correlation rules. Auto-correlation rules primarily check for a unique match using seed points and then correlate.

You can correlate the following Smart 3D objects with corresponding P&ID items:

- Equipment and equipment component
- Pipe nozzle
- Pipeline
- Pipe run
- Pipe features such as end feature, turn feature, and along-leg-feature

What is a Seed Point?

A seed point is a reference object that is used to correlate related objects. Seed points have to be:

- objects that can be correlated based on property match rules, such as equipment, pipelines and pipe nozzles. For example, if a P&ID equipment properties match corresponding Smart 3D equipment properties as per the auto-correlation rules, then that equipment is automatically correlated.
- objects that are already correlated, that is correlating based on topology match rules. For example, a nozzle that is already correlated will become seed point for a connected pipe run to be auto-correlated.

For example, the software compares each 3D pipe run component with its corresponding component of a correlated P&ID pipe run from seed points. If the property match rules are met

and also the topology matches, then the component is correlated successfully. Otherwise, the component is listed as an ambiguous object in the *Auto-Correlate Report* (on page 131).

Ambiguous Objects		
	Design Basis Objects	3D Objects
	3D Type	
P-10116-1"-1C0031-N	U14-1-P-0004-1C0031	Pipe Run
P-10116-1"-1C0031-N		
P-10116-1"-1C0031-N	U14-1-P-0005-1C0031	Pipe Run
P-10116-1"-1C0031-N		

Configure Auto-Correlation Rules

To configure auto-correlation you must consider the following criteria:

- Configure each P&ID item and Smart 3D object with matching naming conventions. Pipe runs are an exception because the correlation for pipe runs with topology is based on defining proper end connections for each pipe run.
- Define the following essential properties on each P&ID item and Smart 3D object, and also their properties must match.

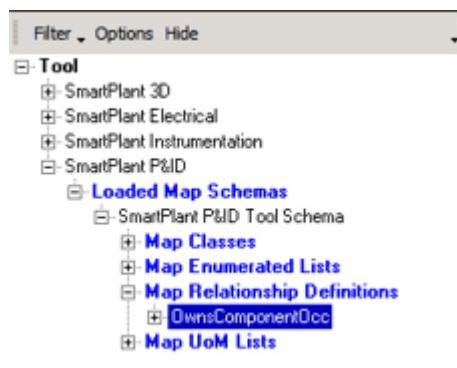
Item/Object	P&ID Property	Smart 3D Property
Equipment	Item Tag	Name
Pipe nozzle	Item Tag	Name
	NPD	NPD Units
Pipeline	Pipeline Name	Pipeline Name
Pipe run	Specification Name	Specification Name
	NPD	NPD Units
	Topologically correlated connections	
Pipe component	Component Type	Component Type
	NPD	NPD Units
	Item Tag	Name

- You must enable the **OwnsComponentOcc** relationship in the **SPPIDDataMap.xml**. The **OwnsComponentOcc** relationship correctly assigns component ownership at specification breaks. If you do not enable this relationship, auto-correlation for components may result in ambiguities instead of assigning the components to the correct object.

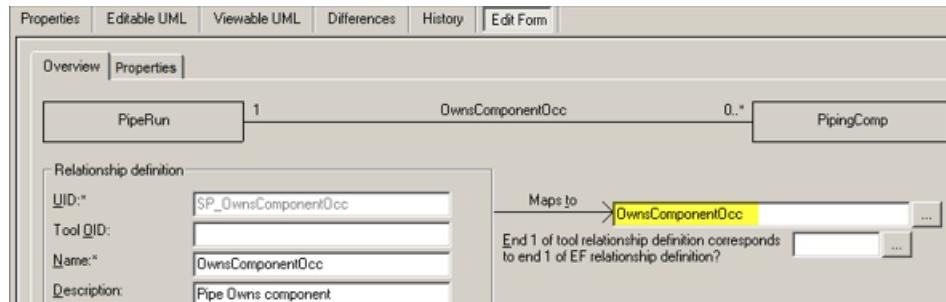
NOTE By default, this relationship is not enabled in **SPPIDDataMap.xml** of 2009 SP4.

Following are the steps to enable the **OwnsComponentOcc** relationship in SPPID tool schema file, so that this relationship is published for each inline component including inline instruments and piping components:

1. Launch the Schema Editor.
2. Launch SmartPlant Foundation Desktop Client.
3. On the **File** menu, click **Find > Integration > Schema Documents**.
4. Right-click the appropriate **CMF** file, and then select **Launch Schema Editor**.
5. Open the SmartPlant P&ID Tool Schema.
6. Expand the **Tool** hierarchy, navigate and select **OwnsComponentOcc**.



7. On the **Edit Form** tab > **Maps to** box, type **OwnsComponentOcc**.



8. Click **Change UID**.

Customize Auto-Correlation Rules

Using the Schema Editor, you can customize the auto-correlation rules by modifying the map edge definition for properties that you want to use as correlation basis.

NOTE We recommend that you customize the rule specific to a project.

1. Create a new **MapEdgeDef** for the required property.
2. Enable the new **MapEdgeDef** by setting its **IsCorrelationBasis** to **True**.

IMPORTANT A property applied to a **MapEdgeDef** with **IsCorrelationBasis** set to **False** is not designated as a auto-correlation rule.

Setting the IsCorrelationBasis

1. Expand the **SPMapEdgeDef**, and then select an edge definition.
2. Locate the **IsCorrelationBasis** column for corresponding mapped edge definition. Right-click and select **Edit <SPMapEdgeDef Name>**.

The **Edit Map Edge Definition (SP3DPublishFile.xml)** dialog box displays.

3. In the **Category** list box, select **SmartPlant 3D**.
4. Click **...**, and set **IsCorrelationBasis** to **True**.
5. Save the **SP3DPublishMap.xml**.
6. On the main menu, click **Tools > Tool Schema > Validate > Display Results** to validate the schema.

NOTE Ensure that there are no errors displayed in the validation process.

	Name	IsCorrelationBasis
Equipment	CPEdesignEquipmentToJNNamedItemToName	True
	CPSmartEquipmentToJNNamedItemToName	True
	CPEquipmentToJNNamedItemToName	True
	CPEquipmentComponentToJNNamedItemToName	True
Pipe Nozzle	CPPipeNozzleToJNDPipePortToNpdUnitType	True
	CPPipeNozzleToJNDPipePortToNpd	True
	CPPipelineSystemToJNPipelineSystemToSequenceNumber	True
Pipeline	CPPipelineSystemToJNPipelineSystemToFluidCode	True
	CPPipelineSystemToJNNamedItemToName	False
	CPMPipeRunToJRtePipeRunToNPDUntType	True
Pipe Run	CPMPipeRunToJRtePipeRunToNPDUntType	True
	CPMPipeRunToJNDPipeSpecToSpecName	True
	CPPipeTurnPathFeatToJRtePipePathFeatToType	True
Turn Feature	CPPipeTurnPathFeatToJRtePipePathFeatToTag	True
	CPPipeTurnPathFeatToJRtePipePathFeatToNPDUntType	True
	CPPipeTurnPathFeatToJNNamedItemToName	True
End Feature	CPPipeEndPathFeatToJRtePipePathFeatToType	True
	CPPipeEndPathFeatToJRtePipePathFeatToTag	True
	CPPipeEndPathFeatToJRtePipePathFeatToNPDUntType	True
ALF Feature	CPPipeEndPathFeatToJRtePipePathFeatToNPDUntType	True
	CPPipeEndPathFeatToJNNamedItemToName	True
	CPPipeAlongLegPathFeatToJRtePipePathFeatToType	True
ALF Feature	CPPipeAlongLegPathFeatToJRtePipePathFeatToTag	True
	CPPipeAlongLegPathFeatToJRtePipePathFeatToNPDUntType	True
	CPPipeAlongLegPathFeatToJRtePipePathFeatToNPDUntType	True
ALF Feature	CPPipeAlongLegPathFeatToJNNamedItemToName	True

Define the Scope of Auto-correlation

Before performing auto-correlation, you need to define the scope of auto-correlation on design basis data and 3D model data. If you do not select 3D objects, then the software runs the correlation on selected P&IDs against all 3D objects in the workspace. You can correlate against the entire design basis in the database. However, this workflow affects P&IDs of large models in bulk and is not efficient.

Automatically Correlate with the 3D Model (on page 130)**Correlate Automatically Dialog Box**

Lists all of the retrieved P&IDs in the 3D model that can be used for correlation. You can use CTRL + Select and SHIFT + Select to select multiple drawings to correlate. You can sort the drawings by clicking on the column headers, and filter using the **[Custom Filter]** option.

Name - Displays the name of the P&ID. Click , and select the P&ID name from the list to filter.

- **[All]** - Displays all the available P&IDs. This option is selected by default.
- **[Custom Filter]** - Allows you to customize the object filtering. Displays **AutoCorrelate Custom Filter** when you select this option. To filter, type the exact P&ID name, or type * and % special characters as the first or last characters in the **AutoCorrelate Custom Filter** box.

RevNumber - Displays the number of times the P&ID is reviewed. Click , and select the revision number from the list to filter.

- **[All]** - Displays all the available P&IDs. This option is selected by default.
- **[Custom Filter]** - Allows you to customize the object filtering. Displays **AutoCorrelate Custom Filter** when you select this option. To filter, type the exact number in the **AutoCorrelate Custom Filter** box.

RevDate - Displays the date (YYYYMMDD) that the P&ID is reviewed. Click , and select the date from the list to filter.

- **[All]** - Displays all the available P&IDs. This option is selected by default.
- **[Custom Filter]** - Allows you to customize the object filtering. Displays **AutoCorrelate Custom Filter** when you select this option. To filter, type the exact date in the **AutoCorrelate Custom Filter** box.

Parent - Displays the name of the parent to which the P&ID belongs. Click , and select the parent from the list to filter.

- **[All]** - Displays all the available P&IDs. This option is selected by default.
- **[Custom Filter]** - Allows you to customize the object filtering. Displays **AutoCorrelate Custom Filter** when you select this option. To filter, type the exact parent name or type * and % special characters as the first or last characters in the **AutoCorrelate Custom Filter** box.

Copy properties from design basis - Copies properties from the design basis objects to the corresponding 3D objects. This option is not selected by default. Changes made to this option are saved to the session file.

 **CAUTION** Selecting this option overwrites the 3D object properties with the corresponding correlated design basis object values. Therefore, do not select this option if you do not want to modify the properties of a 3D object.

 **NOTE** Changes made to this option are applied to all the commands that use it. For example, if you select this option in the **Correlate Automatically** dialog box, then this option is also selected in the **Correlate with Design Basis** and **Compare with Design Basis** dialog boxes.

See Also

Correlate Automatically Command (on page 125)

Automatically Correlate with the 3D Model

1. Select only equipment objects in the model by clicking them in a graphic view, dragging a fence around objects, or selecting by filter.

NOTE If no 3D objects are selected, then the software runs the correlation for all selected P&IDs against all 3D objects in the workspace.

2. Select **SmartPlant > Correlate Automatically**.

The **Correlate Automatically** dialog box displays.

3. Select one or more P&IDs from the design basis to correlate.

CAUTION We recommend that you correlate 3D objects that belong to the selected P&ID.

NOTE Verify that the **Copy properties from design basis** check box is clear.

4. Click **OK**.

*If the property match rules are met, then the software correlates all equipment and piping nozzles in the P&ID. The **Auto-correlate Report** is displayed after the auto-correlation process is complete. For more information on the auto correlation report, see Auto-Correlate Report (on page 131).*

5. Resolve any ambiguities in the Auto-Correlate Report:

- a. On the **Auto-Correlate Report > Ambiguous Objects**, click the 3D object to correlate.

The selected 3D object is highlighted and zoomed to in the active view.

- b. Select the appropriate P&ID object to be correlated from the list of possible matches.

The selected design basis object is highlighted yellow in the P&ID Viewer.

- c. On the **Auto-Correlate Report**, click **Correlate**.

TIP Perform these steps until all the ambiguities are resolved.

6. Select only pipeline objects within the workspace, and repeat steps 1 to 4.

If all auto-correlation rules are met, then the software correlates all pipelines, pipe runs, and piping components in the P&ID.

7. Repeat step 5.

8. Click **Cancel** to close the report.

NOTES

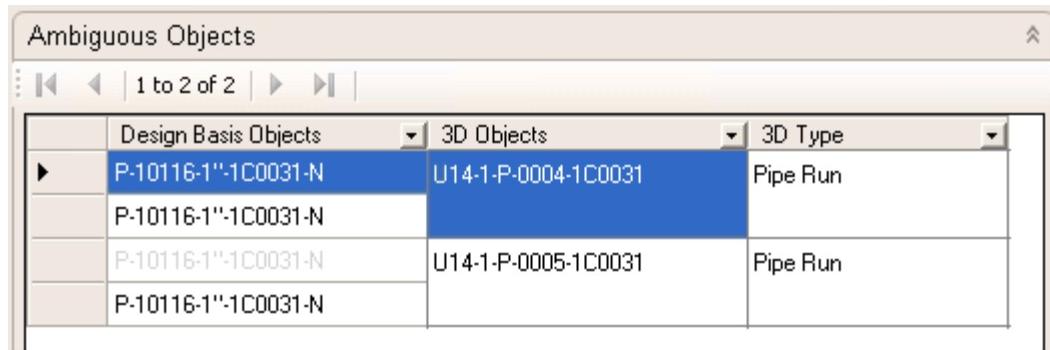
- The log file is stored in the temporary folder of your Documents and Settings folder.
- The software ignores objects that are already correlated in the 3D model.

Auto-Correlate Report

This report is divided into three sections that allow you to review and resolve any correlation discrepancies. You can edit 3D objects, 3D object properties, compare with design basis, manually correlate, and review your edits in the auto-correlate report while it is open.

Ambiguous Objects

This section contains a list of 3D objects with one or more possible matching design basis objects.



The screenshot shows a dialog box titled "Ambiguous Objects". At the top, there is a navigation bar with icons for back, forward, and search, followed by the text "1 to 2 of 2". Below this is a table with three columns: "Design Basis Objects", "3D Objects", and "3D Type". The table contains four rows of data:

Design Basis Objects	3D Objects	3D Type
P-10116-1"-1C0031-N	U14-1-P-0004-1C0031	Pipe Run
P-10116-1"-1C0031-N		
P-10116-1"-1C0031-N	U14-1-P-0005-1C0031	Pipe Run
P-10116-1"-1C0031-N		

Design Basis Objects - Displays the name of the ambiguous design basis object. Click , and select the 3D object from the list to filter ambiguous objects based on the 3D object.

- **[All]** - Displays all the objects. This option is selected by default.
- **[Custom Filter]** - Allows you to customize the object filtering. Displays **AutoCorrelate Custom Filter** when you select this option. To filter, type the exact object name, or type * and % special characters as the first or last characters in the **AutoCorrelate Custom Filter** box.

3D Objects - Displays the name of the 3D object. Click , and select the 3D object from the list to filter ambiguous objects based on the 3D object.

- **[All]** - Displays all the objects. This option is selected by default.
- **[Custom Filter]** - Allows you to customize the object filtering. Displays **AutoCorrelate Custom Filter** when you select this option. To filter, type the exact object name, or type * and % special characters as the first or last characters in the **AutoCorrelate Custom Filter** box.

3D Type - Displays the object type. Click , and select the object type from the list to filter ambiguous objects based on the object type.

- **[All]** - Displays all the objects. This option is selected by default.
- **[Custom Filter]** - Allows you to customize the object filtering. Displays **AutoCorrelate Custom Filter** when you select this option. To filter, type the exact object name, or type * and % special characters as the first or last characters in the **AutoCorrelate Custom Filter** box.

NOTE A 3D object can have one or more design basis objects listed as possible match, when the design basis objects have matching properties with the 3D object.

Not Correlated Objects

This section contains a list of 3D objects that are not correlated with any design basis objects.

Not Correlated Objects			
	Design Basis Objects	3D Objects	3D Type
▶		STFndPort1	Foundation Port
		STFndPort1	Foundation Port
		VDrum01-EC-1-0102	Equipment Component

Design Basis Objects - Displays the name of design basis object for which there is no matching 3D object.

3D Objects - Displays the name of the 3D object. Click and select the 3D object from the list to filter not correlated objects based on the 3D object.

- **[All]** - Displays all the objects. This option is selected by default.
- **[Custom Filter]** - Allows you to customize the object filtering. Displays **AutoCorrelate Custom Filter** when you select this option. To filter, type the exact object name or type * and % special characters as the first or last characters in the **AutoCorrelate Custom Filter** box.

3D Type - Displays the object type. Click and select the object type from the list to filter not correlated objects based on the object type.

- **[All]** - Displays all the objects. This option is selected by default.
- **[Custom Filter]** - Allows you to customize the object filtering. Displays **AutoCorrelate Custom Filter** when you select this option. To filter, type the exact 3D type name or type * and % special characters as the first or last characters in the **AutoCorrelate Custom Filter** box.

NOTES A 3D object is not correlated for the following possible reasons:

- 3D object has no design basis object.
- 3D object does not have a design basis object with matching properties and topology.
- 3D object's parent and the design basis object are not correlated.
- You do not have write permission to update the 3D object.

Correlated Objects

Contains a list of 3D objects with matching design basis objects. This list contains both newly correlated objects and existing correlated objects.

Correlated Objects			
	Design Basis Objects	3D Objects	Correlate Result
▶	N2	N2	New Correlated
	N1	N1	New Correlated
	N1	N1	New Correlated
	N3	N3	New Correlated

Design Basis Objects - Displays the name of the correlated design basis object. Click ▾, and select the 3D object from the list to filter correlated objects based on the 3D object.

- **[All]** - Displays all the objects. This option is selected by default.
- **[Custom Filter]** - Allows you to customize the object filtering. Displays **AutoCorrelate Custom Filter**, when you select this option. To filter, type the exact object name or a special character as the last character in the **AutoCorrelate Custom Filter** box.

3D Objects - Displays the name of the correlated 3D object. Click ▾, and select the 3D object from the list to filter not correlated objects based on the 3D object.

- **[All]** - Displays all the objects. This option is selected by default.
- **[Custom Filter]** - Allows you to customize the object filtering. Displays **AutoCorrelate Custom Filter**, when you select this option. To filter, type the exact object name or a special character as the last character in the **AutoCorrelate Custom Filter** box.

Correlate Result - Specifies whether the object is already correlated or newly correlated. Click ▾, and select the result type from the list to filter the correlated object list based on the correlate result.

- **[All]** - Displays both newly correlated and existing correlated results. This option is selected by default.
- **New Correlated** - Displays only objects that are newly correlated results.
- **Existing Correlated** - Displays only objects that are manually correlated, and the objects that are correlated prior to auto correlation.
- **[Custom Filter]** - Allows you to customize the object filtering. Displays **AutoCorrelate Custom Filter**, when you select this option. To filter, type the exact text in the **AutoCorrelate Custom Filter** box.

3D Type - Displays the object type. Click ▾, and select the object type from the list to filter not correlated objects based on the object type.

- **[All]** - Displays all the objects. This option is selected by default.
 - **[Custom Filter]** - Allows you to customize the object filtering. Displays **AutoCorrelate Custom Filter**, when you select this option. To filter, type the exact 3D type name or a special character as the last character in the **AutoCorrelate Custom Filter** box.
- ▲ - Expands or collapses the section.

Correlate - Correlates selected 3D object and matching design basis object.

Save - Saves the auto correlation report as an xml file.

Cancel - Closes the report.

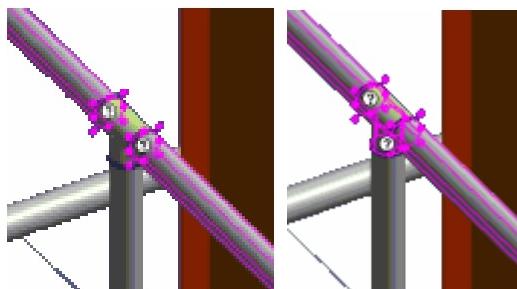
Compare Design Basis Command

Compares the differences in property and topology (or shape) values in the three-dimensional model and the design basis (for example, a P&ID). The purpose of the command is to update the properties on correlated objects so that values for mapped properties (design basis) from tools, such as SmartPlant P&ID and SmartPlant Instrumentation, are updated on the object if you specify to update and pass the values. You can also process deleted objects. As a result, you are managing the changes of the model to match the design basis without having to re-model.

Topology Checker

The topology checker simply starts at one end of the pipeline and moves to the end of the line. There are some rules that you should be aware of in order to make sure the topology checker is running properly.

- Tees and reducers have the unique ability to belong to three different runs. For the purpose of topology comparison, any piping component can be considered to be in two runs.
- A pipe run must be continuous for the topology to be checked properly. This means that no component (tees included) can belong to a different run along that line. For example, if the third component along a pipe run was a tee that belonged to the branch run, then the topology checker would not give proper results because the tee breaks the run. There are piping components that are still members of that first run, but the run is not continuous (left image: tee is not highlighted). After this tee is made a member of the original run, the topology checker gives proper results (right image: tee is highlighted).



For more information on the topology checker, see the *Piping User's Guide*.

NOTE Work Breakdown Structure (WBS) relationships (project or as-built) are shown on the **Property** tab of the **Compare with Design Basis** dialog box. However, the **Update** button does not update project membership for 3D objects to match the design basis.

See Also

Retrieving Data (on page 98)

Compare with Design Basis Dialog Box

Compares and examines the mapped properties for both the design basis object on the P&ID and in the 3D model. This dialog box identifies the properties that are different due to a discrepancy. You can update all of the properties listed in the dialog box by clicking **Update**.

NOTE Work Breakdown Structure (WBS) relationships (project or as-built) are shown on the **Property** tab. However, the **Update** button does not update project membership for 3D objects to match the design basis.

See Also

Compare Design Basis Command (on page 134)

Correlate with Design Basis Command (on page 118)

Properties Tab (Compare with Design Basis Dialog Box) (on page 135)

Topology Tab (Compare with Design Basis Dialog Box) (on page 136)

Properties Tab (Compare with Design Basis Dialog Box)

Selected - Specifies the name of the selected object in the 3D model. The **Selected** drop-down lists all objects in the 3D model that are correlated with the design basis object.

Category - States the category for the property. Properties are listed in alphabetical order according to the interface of the category that you selected for the property pages of the 3D model. Select **All** to list all the properties in alphabetical order.

The read-only field beside the **Category** box provides the following information about the correlation for the object that you selected in the 3D model:

- **Property Match** - Indicates that the object that you selected in the model has all properties matching those of its correlated design basis object.
- **Property Mismatch** - Indicates that the object that you selected in the model has one or more properties with values not matching the value of the mapped property in the correlated object.

The check box beside the **Model Property Name** allows you to selectively update the properties in the list. You must select **Copy properties from design basis** to enable the selective update check boxes.

- indicates clear or disabled state. Selective update is disabled or none of the properties are selected for update.
- indicates select state. All the properties in the list are selected for update.
- indicates mixed state. One or more properties in the list are either read-only or not selected for update.
- indicates read-only. You cannot update this property.

NOTES

- You must check the selective update check box of the corresponding property to set its correlation status to **Property Match**.
- The software remembers the last saved selective update preference for an object type such as a pipe run, equipment, and pipeline system. For example, if you do not want to update **Name** for piperun1, clear the checkbox corresponding to **Name**, and then click **Update**.

When you correlate piperun2, the dialog box displays your preference from the piperun1 you last correlated.

Model Property Name - States the name of the property for the model object.

Design Basis Value - States the value of the property for the design basis object.

Model Value - States the value of the property for the three-dimensional model object.

Correlation Approval Status - Specifies if the object is approved with discrepancies in the 3D model data compared with design basis data. Select **Topology mismatch approved** if the object topology mismatch can be ignored. Select **Data and Topology mismatches approved** if the object data and topology mismatches can be ignored. Select **None** if you do not want to approve a mismatch.

Copy properties from design basis - Controls copying of properties from the design basis object to the 3D model object. Select this option to allow the update of 3D object properties during manual correlation. Clearing this option clears and disables all the selective update check boxes.

Update - Transfers data from the design basis object (in the P&ID, for example) to match the 3D model object. Clicking **Update** changes entire property values if selective update check box is disabled.

Close - Closes the **Compare with Design Basis** dialog box.

NOTE Work Breakdown Structure (WBS) relationships (project or as-built) are shown on the **Property** tab. However, the **Update** button does not update project membership for 3D objects to match the design basis.

See Also

Compare Design Basis with the Model (on page 137)

Compare with Design Basis Dialog Box (on page 135)

Topology Tab (Compare with Design Basis Dialog Box)

Displays the child objects of the selected grouping object and indicates both the 3D objects not correlated to the P&ID (design basis) and also the P&ID objects (design basis) not correlated to 3D objects. For example, when you select a pipe run, the **Topology** tab indicates objects that are correlated and in the same order on the pipe run, as well as objects that are correlated and not in the same order on the pipe run.

NOTE This tab is available only for those objects that support correlation and get topology from the design basis.

Selected

Displays the name of the selected object in the 3D model.

The read-only field provides the following information about the correlation for the object you selected in the 3D model:

- **Topology Match** - Indicates that the object in the model you selected has a match or correlation with an object in the design basis.
- **Topology Mismatch** - Indicates that the object in the model you selected does not have a match or correlation with an object in the design basis.

#

Indicates an index number to reference the object as defined in the design basis (that is, the

drawing).

Design Basis Name

States the name of the object in the design basis (for example, a pipe run).

Model Name

States the name of the object in the 3D model.

Select

Selects a row in the grid. The object highlights in the model.

Close

Closes the **Compare with Design Basis** dialog box.

NOTE If a discrepancy exists on the **Topology** tab after clicking **Update** on the **Properties** tab, you can trace the discrepancy and attempt to resolve it. For example, a discrepancy might be an object routed or placed out of order.

See Also

Compare Design Basis with the Model (on page 137)

Compare with Design Basis Dialog Box (on page 135)

Compare Design Basis with the Model

The **Compare with Design Basis** command allows you to resolve discrepancies between an object in the 3D model and the design basis.

1. Click **SmartPlant > Retrieve** to retrieve data into the software.
2. Click **SmartPlant > View P&ID** to open the P&ID that contains the data that you retrieved.
3. Select an object on the P&ID or in the model.
4. Click **SmartPlant > Compare Design Basis**.
5. Review the **Properties** tab for highlighted objects that have a discrepancy between the P&ID and the three-dimensional model. Objects that do not match appear in a different background color (red).
6. Review the **Topology** tab to check for differences in shapes between the P&ID and the 3D model. This tab is available only for objects that support correlation.

TIP When you select a pipe run, the **Topology** tab indicates objects that are correlated and in the same order on the pipe run, as well as objects that are correlated and not in the same order on the pipe run.

7. Click **Close** if you do not want to update the properties from design basis.

-OR-

After you correct the errors that cause the discrepancy, click **Update** on the **Compare with Design Basis** dialog box to transfer data from the design basis object to the 3D model

object and update properties that are out-of-date. The **Design Basis Value** and the **Model Value** columns change to show the new values.

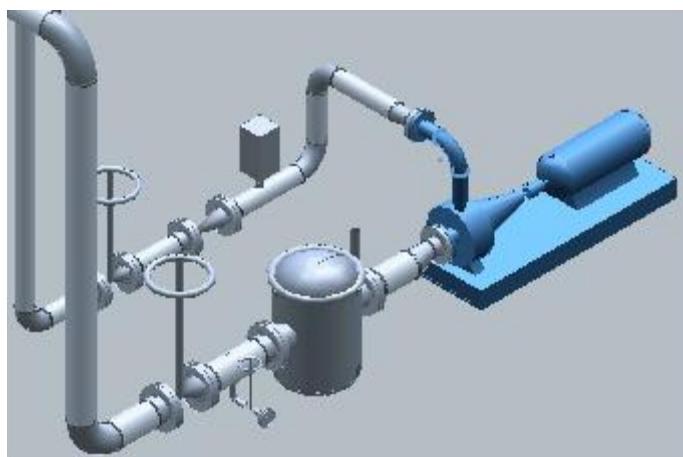
! TIPS

- Clicking **Update** changes the property values. You can selectively update properties by selecting associated check boxes. For more information see, *Properties Tab (Compare with Design Basis Dialog Box)* (on page 135).
- For certain exceptions, the software does not process an update. For example, an object that is not mapped with properties is not updated.

8. When you have finished your review, click **Close**.

Route Pipe

 Creates, models, and extends pipe runs quickly and precisely. Pipe runs may be straight or circular, and, in general, behave the same way. All pipe run features and components are driven by constraints, piping specifications, and catalogs.



By default, the software uses fast mode to dynamically display a pipe run as you define the route. When in fast mode, the software does not render elbows or turns during the dynamic display; instead, the software displays the elbows and turns after you define the pipe run location. You cannot route a non-radial branch while in fast mode. Press SHIFT+F to turn off fast mode.

The **Route Pipe** command also works with the **Insert Split**  and **Insert Component**  commands to add features while routing. After placing the feature, such as a gate valve, the route command automatically restarts from the open port of the inserted feature. **Route Pipe** also uses the concept of routing on a plane to enable the quick, precise creation of pipe runs.

The **Route Pipe** command supports the following:

- Routing using an existing pipe run
- Routing using a newly created pipe run
- Routing using a pipe run defined in the P&ID design basis (if P&ID design basis data is available)
- Routing to and from an end feature

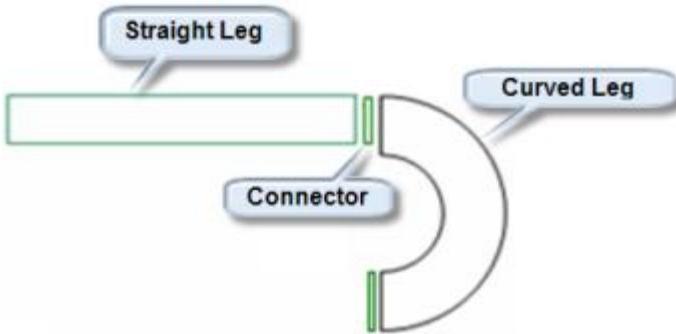
- Routing to and from an equipment nozzle
- Routing to and from a straight feature (creating a branch)
- Inserting a component while routing
- Inserting a split while routing

When routing any pipe run, the major steps include selecting a starting point, defining the characteristics of the run (nominal pipe diameter, piping specification, options), routing the run point-by-point, and selecting the end point of the run. To route an arc pipe run, you include a center point, as well.

Routing a Circular or Arc Pipe

You use the **Route Pipe** command ribbon to model arc pipes, such as might be needed in gas turbines or in the nuclear industry for carrying fluids. You can place a circular ring or route out of bends using branch fittings, components or stub-ins.

When the curve leg and normal leg connect, **Route Pipe** places a new zero-angle turn called a *connector*. The curve leg can hold all the route pipe features except straight-leg and end-leg. If the curve-leg is a full ring, then it can only have curve and along-leg features on the leg.



A curve leg with a single curve feature may be placed, but it is not logged in the **To-Do** list. You will need to manually insert the split point.

Routing To or From a Straight Feature, End Feature, or Nozzle

In addition to the basic functions of creating new runs or extending previous runs, the **Route Pipe** command supports routing to or from straight features, end features, and nozzles.

When routing a pipe run, you can define the run starting point either before or after clicking the **Route Pipe** command. In either case, if a feature was selected, the command determines the default working plane based on that feature. Additionally, the command determines whether to continue the pipe run associated with that feature or to create a new run. The software automatically generates any parts required for the connection, including branch components. This functionality allows you to easily extend or branch out of a previously modeled pipe run.

Preventing Skewed, Non-Square, and Non-Plumb Piping

Occasionally, you might accidentally model piping that is slightly askew, out of plumb, or not square and not notice the error. If you continue routing, it results in the propagation of the original error to other runs. To help you avoid this problem, the software performs these checks:

Major Axis Check

The software checks if newly created legs or modified legs are slightly off alignment of a major coordinate system axis. For non-sloped pipes, the software displays a message if the leg is between 0.05° and 3.00° off the major axis. For sloped pipes, the range is 1.50° and 4.50°. Both ranges can be customized by editing the registry in your computer. Contact Intergraph support for more information, <http://support.intergraph.com>.

Square Check

When you model a leg that connects to an existing leg, the software checks the angle between the two legs and displays a message when the angle is between 87.00° and 89.95°, or between 90.05° and 93.00° for non-sloped pipes. For sloped pipes, the ranges are 85.50° and 88.50°, and 91.50° and 94.50°. You can customize these ranges also by editing the registry in your computer.

Small Turn Feature Check

The software anticipates that angles equal to or less than the specified values are a result of a "fit-up" and, as such, do not need a turn feature. The registry entries, **SupressTurnFeatureMinimumAngle** and **SupressTurnFeatureMinimumAngleSloped** control the turn feature placement, and are stored in `HKEY_LOCAL_MACHINE\Software\Intergraph\SP3D\CommonRoute\AnglePreferences`. You can customize these values. Any changes made to the registry are at your own risk.

★IMPORTANT Be aware that even though a turn feature is not modeled, the angle between the legs is not modified and remains as you modeled it.

- **SupressTurnFeatureMinimumAngle** - Does not place a turn feature if the pipe angle is equal to or less than the specified value. The default value is 0.5°.
- **SupressTurnFeatureMinimumAngleSloped** - Does not place a turn feature if the sloped pipe angle is equal to or less than specified value. The default value is 0.25°.

Route Pipe Ribbon

Sets options for routing a pipe.

Straight Pipe



Displays the **Route Pipe Settings** dialog box. For more information, see *New Pipe Run Dialog Box* in the Smart 3D piping documentation.



Click to model a straight pipe.



Click to model an arc pipe.



Click to specify the starting location for the pipe run. The starting point can be an equipment nozzle, an open port of a feature such as a tee or valve, the end feature of another pipe run, or a point in space.



Click to specify the end point of the current pipe run. The end point can be an equipment nozzle, an open port of a feature such as a tee or valve, the end feature of another pipe run, or a point in space. If the end point is a point in space, then that point serves as the starting point for the next leg of the pipe run.

Plane

Activates options for selecting a working plane for the route path. Six options are available:

-  **Plan Plane** - Defines the work surface as the XY plane at the depth of the active end. You also can press CTRL+1 to select this option.
-  **Elevation Plane: East-West** - Defines the work surface as the XZ plane. You also can press CTRL+2 to select this option.
-  **Elevation Plane: North-South** - Defines the work surface as the YZ plane. You also can press CTRL+3 to select this option.
-  **Plane by Turn/Branch** - Defines the work surface as the plane defined by an existing turn or branch. You select the turn or branch to set the plane. You also can press CTRL+4 to select this option.
-  **Plane by Three Points** - Defines the work surface using three points that you define. You also can press CTRL+5 to select this option.
-  **No Plane** - Clears any work surfaces. The software does not project points that you place to any plane. You also can press CTRL+6 to select this option.

Run

Displays existing pipe runs along with the **<New Pipe Run>**, **<New/Continue Run>**, **<Select from P&ID>**, **<Select Graphically>**, and **More** options. Select the pipe run to route or select **<New Pipe Run>** to create a new pipe run to route. If a new pipe run is created, all runs associated with the parent pipeline selected on the **New Pipe Run** dialog box appear in the list.

Select **<New/Continue Pipe Run>** to automatically extend an existing pipe run by selecting the end feature of that pipe run. If a run is continued, all runs associated with the pipeline parent of the continued run appear in the list. If you do not select an end feature, the **New Pipe Run** dialog box automatically activates to create a pipe run. For more information, see *New Pipe Run Dialog Box* in the Smart 3D piping documentation.

Select **<Select from P&ID>** to graphically select a run in a P&ID to route. When you select the run in the P&ID, the software checks if the run already exists in the Smart 3D model. If the run does exist, the current run is set to that run. If the run does not exist, the **New Pipe Run** dialog box displays using values from the run that you selected in the P&ID as the defaults. When you click **OK**, the run is created, and then correlated to the run in the P&ID.

Select **<Select Graphically>** to select an existing run in a graphic view, the Workspace Explorer, or the P&ID View.

Select **More** to select a pipe run that is associated with a different pipeline parent. For more information, see *Select Pipe Run Dialog Box* in the Smart 3D piping documentation.

Lock Angle

Locks or unlocks the **Angle** box.

Angle

Type or select an angle for the current route segment. You can type any value needed,

provided it does not conflict with the defined specifications. If the **Angle Lock** is unlocked, this box displays a dynamic readout of the current bend angle. If you have **No Plane**  selected, you can only lock the angle to 0 and 90 degrees.

Turn Option

Select the option code associated with the turn component that you want to use while routing. Only those option codes defined in the controlling piping specification and shared by all of the short codes that can be placed automatically while routing appear. Only the options available for all short codes available during routing are listed. If pipe spec writer only added a second choice for 90 degree direction change, then route would not display it in the drop down list.

Lock Length

Locks or unlocks the **Length** box.

Length

If **Lock Length** is locked, type or select a length for the current route segment. If **Lock Length** is unlocked, this box displays the length of the current pipe run being placed.

Straight Option

Select the option code associated with the pipe that you want to use while routing. Only those option codes defined in the controlling piping specification appear.

Offset

Controls the SmartSketch offset constraint. Type the distance that you want to offset the pipe that you are routing. Select **<Disabled>** if you do not want to use the offset constraint to help route the pipe. Select **Set Offset Reference** to define the reference point. For more information on setting the reference point, see *Set Offset Reference Dialog Box* in the Smart 3D piping documentation.

Lock Slope

Locks or unlocks the **Slope** box.

Slope

Displays the defined minimum slope for the run. This option is only enabled when you defined a slope on the **New Pipe Run** dialog box. If a value greater than or equal to the minimum slope of the run is typed, it is applied only to the leg currently being routed. After the leg is modeled, the value of the **Slope** box reverts to the minimum slope defined for the pipe run. You cannot type a slope value that is less than the minimum slope specified for the pipe run except for 0 to route a horizontal leg in the pipe run. Select **Use Default Slope** to automatically change the slope value to match the **Minimum Slope** property of the pipe run. You can change the units of measure for the slope using **Tools > Options > Units of Measure**.

Circular or Arc Pipe

Properties

Displays the **Route Pipe Settings** dialog box. For more information, see *New Pipe Run Dialog Box* in the Smart 3D piping documentation.

Straight Routing

Click to model a straight pipe.

Arc Routing

Click to model an arc pipe.

Arc Start Point

Click to specify the starting location for the arc pipe run. The starting point can be an equipment nozzle, an open port of a feature such as a tee or valve, the end feature of another pipe run, or a point in space.

Arc Center Point

Click to specify the center point for the arc pipe run.

Arc End Point

Click to specify the end point for the arc pipe run. The end point can be an equipment nozzle, an open port of a feature such as a tee or valve, the end feature of another pipe run, or a point in space. If the end point is a point in space, then that point serves as the starting point for the next leg of the pipe run.

Finish

Click to indicate that the points are set and the arc may be routed.

Plane

Activates options for selecting a working plane for the route path.

-  **Plan Plane** - Defines the work surface as the XY plane at the depth of the active end. You also can press CTRL+1 to select this option.
-  **Elevation Plane: East-West** - Defines the work surface as the XZ plane. You also can press CTRL+2 to select this option.
-  **Elevation Plane: North-South** - Defines the work surface as the YZ plane. You also can press CTRL+3 to select this option.
-  **Plane by Turn/Branch** - Defines the work surface as the plane defined by an existing turn or branch. You select the turn or branch to set the plane. You also can press CTRL+4 to select this option.
-  **Plane by Three Points** - Defines the work surface using three points that you define. You also can press CTRL+5 to select this option.
-  **No Plane** - Clears any work surfaces. The software does not project points that you place to any plane. You also can press CTRL+6 to select this option.

Run

Displays existing pipe runs along with the **<New Pipe Run>**, **<New/Continue Run>**, **<Select from P&ID>**, **<Select Graphically>**, and **More** options. Select the pipe run to route or select **<New Pipe Run>** to create a new pipe run to route. If a new pipe run is created, all runs associated with the parent pipeline selected on the **New Pipe Run** dialog box appear in the list.

Select **<New/Continue Pipe Run>** to automatically extend an existing pipe run by selecting the end feature of that pipe run. If a run is continued, all runs associated with the pipeline parent of the continued run appear in the list. If you do not select an end feature, the **New Pipe Run** dialog box automatically activates to create a pipe run. For more information, see

New Pipe Run Dialog Box in the Smart 3D piping documentation.

Select <**Select from P&ID**> to graphically select a run in a P&ID to route. When you select the run in the P&ID, the software checks if the run already exists in the Smart 3D model. If the run does exist, the current run is set to that run. If the run does not exist, the **New Pipe Run** dialog box displays using values from the run that you selected in the P&ID as the defaults. When you click **OK**, the run is created, and then correlated to the run in the P&ID.

Select <**Select Graphically**> to select an existing run in a graphic view, the Workspace Explorer, or the P&ID View.

Select **More** to select a pipe run that is associated with a different pipeline parent. For more information, see *Select Pipe Run Dialog Box* in the Smart 3D piping documentation.

Lock Arc radius

Locks or unlocks the **Arc radius** box.

Arc radius

Type or select the radius of the arc pipe. Select **Maintain Same Radius** to route an arc pipe from the existing arc maintaining the same radius. This option appears only when you route from an existing arc.

Lock Arc Angle

Locks or unlocks the **Arc angle** box.

Arc Angle

Type or select an angle for the arc segment. You can type any value needed, provided it does not conflict with the defined specifications. If the **Arc Angle Lock** is unlocked, this box displays a dynamic readout of the current arc angle. If you have **No Plane**  selected, you can only lock the angle to 0 and 90 degrees.

Lock Arc Length

Locks or unlocks the **Arc length** box.

Arc Length

If **Lock Arc Length** is locked, type or select a length for the current route segment. If **Lock Arc Length** is unlocked, this box displays the length of the current pipe run being placed.

Straight option

Select the option code associated with the pipe that you want to use while routing. Only those option codes defined in the controlling piping specification appear.

Modify Pipe Run Ribbon

Properties

Displays the **Pipe Run Properties** dialog box. For more information, see *Pipe Run Properties Dialog Box* in the Smart 3D piping documentation.

Run

Displays the name of the pipe run. You can select an existing run in a graphic view or the Workspace Explorer.

Pipeline

Displays the pipeline system to which the pipe run belongs. Select **More** to associate the pipe run to another pipeline system.

Minimum Slope

Displays the minimum slope for the pipe run. You must specify a minimum slope value for a sloped pipe run.

Select a core run to Add or Remove / Select Jacket Run(s) to Add or Remove

Modifies core and jacketed pipe run relationship. You can select either core pipe run or the jacketed pipe run to modify the relationship. The tooltip varies based on the type of pipe run you first select.

Finish

Select to establish the core and jacketed pipe relationship.

Modify Pipe Straight Feature Ribbon

Displays options for editing a straight feature.

Properties

Displays the **Pipe Straight Feature Properties** dialog box. For more information, see *Pipe Straight Feature Properties Dialog Box* in the Smart 3D piping documentation.

Move From

Click to specify the starting location of the move vector. If you do not define a starting point, the software assumes that the current location of the object is the starting point.

Move To

Click to specify the ending location of the move vector.

Plane

Activates options for selecting a working plane for the route path. Six options are available:

-  **Plan Plane** - Defines the work surface as the XY plane at the depth of the active end. You also can press CTRL+1 to select this option.
-  **Elevation Plane: East-West** - Defines the work surface as the XZ plane. You also can press CTRL+2 to select this option.
-  **Elevation Plane: North-South** - Defines the work surface as the YZ plane. You also can press CTRL+3 to select this option.
-  **Plane by Turn/Branch** - Defines the work surface as the plane defined by an existing turn or branch. You select the turn or branch to set the plane. You also can press CTRL+4 to select this option.
-  **Plane by Three Points** - Defines the work surface using three points that you define. You also can press CTRL+5 to select this option.
-  **No Plane** - Clears any work surfaces. The software does not project points that you place to any plane. You also can press CTRL+6 to select this option.

Run

Displays the name of the pipe run with which the selected feature is associated. All other

pipe runs associated with the same pipeline parent also appear in the list. Another pipe run can be selected if needed. Select **<Select Graphically>** to select an existing run in a graphic view, the Workspace Explorer, or the P&ID View. Select **More** to select a pipe run associated with a different pipeline.

Type

Displays the short code associated with the selected pipe. The **Type** list also contains the short codes associated with any other pipes defined in the piping specification for the current nominal diameter. Selecting an entry from the **Type** list replaces the selected pipe with one of a different type.

Option

Displays the option of the selected pipe. The **Option** list also contains any options defined in the piping specification for the short code selected in the **Type** box. For example, if two different wall thickness values are available in the piping specification for the short code selected in the **Type** box, both options appear in this list. Selecting another entry from the **Option** list updates the object accordingly.

Lock Length

Defines whether or not the length of the selected pipe should remain constant while moving.

When locked , the software automatically modifies the turn points, along with the length and angle of adjacent straight features, to remain connected to the moved leg. The length of the moved leg does not change.

When not locked , the software extends or shortens the associated legs to connect with the new position of the moved pipe. The length of the moved leg can change. Any component, such as a valve, on the moved pipe maintains its relative position from the pipe ends.

Offset

Controls the SmartSketch offset constraint. Type the distance that you want to offset the pipe that you are editing. Select **<Disabled>** if you do not want to use the offset constraint. Select **Set Offset Reference** to define the reference point. For more information on setting the reference point, see *Set Offset Reference Dialog Box* in the Smart 3D piping documentation.

Slope

Displays the slope of the selected straight feature. This option displays only for sloped pipe runs.

Modify Pipe End Feature Ribbon

Displays options for editing an end component, such as a cap, blind flange, or a pipe end.

Properties

Displays the **Pipe End Feature Properties** dialog box. For more information, see *Pipe End Feature Properties Dialog Box* in the Smart 3D piping documentation.

Move From

Click to specify the starting location of the move vector. If you do not define a starting point, the software assumes that the current location of the object is the starting point.

Move To

Click to specify the ending location of the move vector.

 **NOTE** When you move or modify a route object in HVAC, Electrical, or Piping, Smart 3D treats any unfinished ends as free end features. An unfinished end is an end with mating parts or a logical data connection with one logical port. You can reconnect using these free end features. This behavior allows you to reuse existing mating parts and connections and reduces wait times.

Plane

Activates options for selecting a working plane for the route path. Six options are available:

-  **Plan Plane** - Defines the work surface as the XY plane at the depth of the active end. You also can press CTRL+1 to select this option.
-  **Elevation Plane: East-West** - Defines the work surface as the XZ plane. You also can press CTRL+2 to select this option.
-  **Elevation Plane: North-South** - Defines the work surface as the YZ plane. You also can press CTRL+3 to select this option.
-  **Plane by Turn/Branch** - Defines the work surface as the plane defined by an existing turn or branch. You select the turn or branch to set the plane. You also can press CTRL+4 to select this option.
-  **Plane by Three Points** - Defines the work surface using three points that you define. You also can press CTRL+5 to select this option.
-  **No Plane** - Clears any work surfaces. The software does not project points that you place to any plane. You also can press CTRL+6 to select this option.

Run

Displays the name of the pipe run with which the selected end feature is associated.

Type

Displays the short code associated with the selected end. The **Type** list also contains the short codes associated with any other end components defined in the piping specification for the current nominal diameter. Selecting an entry from the **Type** list replaces the selected end component with one of a different type.

Option

Displays the option of the selected end. The **Option** list also contains any options defined in the piping specification for the short code selected in the **Type** box. Selecting another entry from the **Option** list updates the object accordingly.

Lock Angle

Locks or unlocks the **Angle** box.

Angle

Displays the angle of any turn or branch component that is located at the other end of the leg with which the selected end feature is associated. If no turn or branch exists at the other end of the leg, then this box is disabled. Changing the angle value adjusts the position of the selected end feature to achieve the specified angle and then locks that angle value. When this box is unlocked, the value updates dynamically as the selected end component is moved.

Lock Length

Locks or unlocks the **Length** box.

Length

Displays the length of the run leg connected to the end being edited. Typing a value in this box adjusts the position of the selected end feature to achieve the specified length and then locks that length value. When this box is unlocked, the value updates dynamically as the selected end component is moved.

Offset

Controls the SmartSketch® offset constraint. Type the distance that you want to offset the pipe that you are routing. Select **<Disabled>** if you do not want to use the offset constraint to help route the pipe. Select **Set Offset Reference** to define the reference point. For more information on setting the reference point, see *Set Offset Reference Dialog Box* in the Smart 3D piping documentation.

Lock Slope

Locks or unlocks the **Slope** box. This option displays only for sloped pipe runs.

Slope

Displays the defined minimum slope for the end feature. Select **Use Default Slope** to automatically change the slope value to match the **Minimum Slope** property of the pipe run. You can change the units of measure for the slope using **Tools > Options > Units of Measure**. This option displays only for sloped pipe runs.

Modify Branch Feature Ribbon

Displays options for branches placed in the model.

Properties

Activates the properties dialog box for the selected branch. For more information, see *Pipe Component Feature Properties Dialog Box* in the Smart 3D piping documentation.

Move From

Click to identify the origin of the move vector. If you do not define a starting point, the software assumes that the current location of the branch is the starting point.

Move To

Click to identify the termination point of the move vector.

Type

Displays the short code associated with the selected branch. The **Type** list also contains the short codes associated with any other branches defined in the piping specification for the current nominal diameter. Selecting an entry from the **Type** list replaces the selected branch with one of a different type.

Option

Displays the option of the selected branch. The **Option** list also contains any options defined in the piping specification for the short code selected in the **Type** box. Selecting another entry from the **Option** list updates the object accordingly.

Run

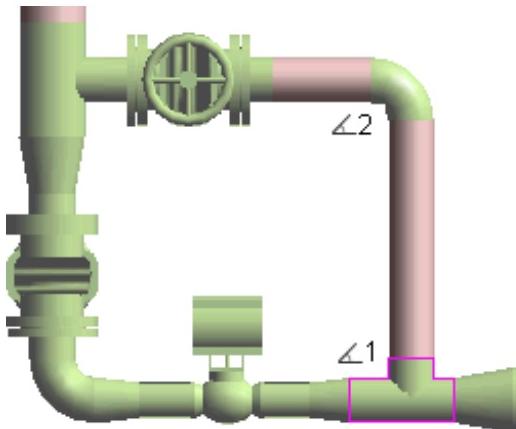
Displays the name of the pipe run to which the branch is associated. All other pipe runs associated with the same pipeline parent also appear in the list. Another pipe run can be selected if needed. Select **<New Pipe Run>** to create a new pipe run to route. Select **<Select Graphically>** to select an existing run in a graphic view, the Workspace Explorer, or the P&ID View. Select **More** to select a pipe run associated with a different pipeline.

Angle 1

Specifies the angle of the branch.

Angle 2

Specifies the angle of the turn or branch feature located at the other end of the branch leg. If this box is blank, there is no turn or branch feature located at the end of the branch leg.



Flip

Orients the branch so that the selected port is located at the insertion point. If a lateral, tee, or other tee-type branch is located along the length of a pipe or between two components, only the in-line ports of the component are available when flipping. However, if the same component is located at the end of a pipe run, all component ports are available.

Rotate

Select to rotate the branch about the pipe interactively. This option is available only when nothing has been connected to the branch port.

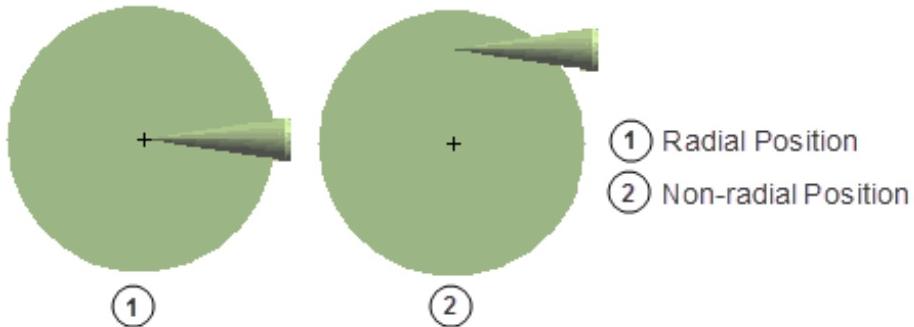
Angle

Type an angle at which you want the branch rotated about the pipe. This option is available only when nothing has been connected to the branch port.

Branch Position

Select the position of the branch centerline relative to the header centerline. Select **Radial** to place the branch such that its centerline intersects the header centerline. Select **Non-Radial** to place the branch such that its center line does not intersect the header centerline. If you select **Non-Radial**, you can specify the distance the branch centerline is offset from

the header centerline up to being tangent to the outside diameter of the header.



Modify Turn Feature Ribbon

Displays options for turns or bends placed in the model.

Properties

Activates the properties dialog box for the selected turn. For more information, see *Pipe Turn Feature Properties Dialog Box* in the Smart 3D piping documentation.

Move From

Click to identify the origin of the move vector. If you do not define a starting point, the software assumes that the current location of the turn is the starting point.

Move To

Click to identify the termination point of the move vector.

Plane

Activates options for selecting a working plane for the turn. Six options are available:

- **Plan Plane** - Defines the work surface as the XY plane at the depth of the active end. You also can press CTRL+1 to select this option.
- **Elevation Plane: East-West** - Defines the work surface as the XZ plane. You also can press CTRL+2 to select this option.
- **Elevation Plane: North-South** - Defines the work surface as the YZ plane. You also can press CTRL+3 to select this option.
- **Plane by Turn/Branch** - Defines the work surface as the plane defined by an existing turn or branch. You select the turn or branch to set the plane. You also can press CTRL+4 to select this option.
- **Plane by Three Points** - Defines the work surface using three points that you define. You also can press CTRL+5 to select this option.
- **No Plane** - Clears any work surfaces. The software does not project points that you place to any plane. You also can press CTRL+6 to select this option.

Run

Displays the name of the pipe run with which the selected turn is associated. All other pipe runs associated with the same pipeline parent also appear in the list. Another pipe run can be selected if needed. Select **<New Pipe Run>** to create a new pipe run to route. Select

<**Select Graphically**> to select an existing run in a graphic view, the Workspace Explorer, or the P&ID View. Select **More** to select a pipe run associated with a different pipeline.

Type

Displays the short code associated with the selected turn. The **Type** list also contains the short codes associated with any other turns defined in the piping specification for the current nominal diameter. Selecting an entry from the **Type** list replaces the selected turn with one of a different type.

Option

Displays the option of the selected turn. The **Option** list also contains any options defined in the piping specification for the short code selected in the **Type** box. For example, if two different wall thickness values are available in the piping specification for the short code selected in the **Type** box, both options appear in this list. Selecting another entry from the **Option** list updates the object accordingly.

Flip

Orients the turn so that the other turn port is connected to the end of the run. This option is available only when a turn is connected to the end of a run and no other part has been connected to the other turn port.

Lock Angle

Locks or unlocks the **Angle 2** and **Angle 3** boxes. Locking the corresponding angle value creates a constraint along which the selected turn angle can be moved.

Angle 2

Specifies the angle of the turn feature located at the end of one associated leg. If this box is blank, there is no turn feature located at the end of the leg. When you select this box, the software highlights the **Angle 2** turn feature in the model. Although this value can be changed, the location of the corresponding turn cannot. Modification of this value repositions the selected turn until the specified angle is achieved.

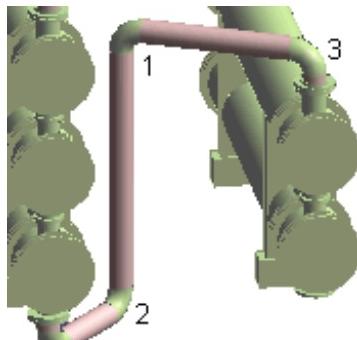
Angle 1

Specifies the angle of the turn that you are editing. Modification of this value repositions the selected turn until the specified angle is achieved.

Angle 3

Specifies the angle of the turn feature located at the end of one associated leg. If this box is blank, there is no turn feature located at the end of the leg. When you select this box, the software highlights the **Angle 2** turn feature in the model. Although this value can be changed, the location of the corresponding turn cannot. Modification of this value repositions

the selected turn until the specified angle is achieved.



Locations of Angles 1, 2, & 3

Offset

Controls the SmartSketch offset constraint. Type the distance that you want to offset the pipe that you are routing. Select **<Disabled>** if you do not want to use the offset constraint to help route the pipe. Select **Set Offset Reference** to define the reference point. For more information on setting the reference point, see *Set Offset Reference Dialog Box* in the Smart 3D piping documentation.

Modify Slope

Activates the **Modify Slope** dialog box, with which you can modify the slope of the legs on either side of the selected turn. For more information, see *Modify Slope Dialog Box* in the Smart 3D piping documentation.

Modify Pipe Part Ribbon

Displays options for editing the selected object. This ribbon displays when you set the **Locate Filter to Piping Parts**, and select a part in the model.

Properties

Displays the properties dialog box for the selected object.

Run

Displays the name of the pipe run with which the selected object is associated. You cannot change the run.

Type

Displays the short code associated with the selected object. The **Type** list also contains the short codes associated with any other objects defined in the piping specification for the current nominal diameter. Selecting an entry from the **Type** list replaces the selected object with one of a different type.

 **NOTE** This option is read-only for generic piping component.

Option

Displays the option of the selected object. The **Option** list also contains any options defined in the piping specification for the short code selected in the **Type** box. For example, if two different wall thickness values are available in the piping specification for the short code selected in the **Type** box, both options appear in this list. Selecting another entry from the

Option list updates the object accordingly.

 **NOTE** This option is read-only for generic piping component.

Name

Specifies the object name. You can type a new name if needed.

 **NOTE** This option is read-only for generic piping component.

Tag

Specifies the engineering tag for the object.

 **NOTE** This option is read-only for generic piping component.

Base/Mating Part

Displays whether the selected object is a base part or a mating part. If the object is a mating part, you can use this option to change the object to a base part. Use caution however, because after a mating part has been changed to a base part, it cannot be changed back to a mating part again.

 **NOTE** This option is read-only for generic piping component.

Modify Surface Mount Pipe Component Ribbon

Displays options for surface mount pipe components placed in the model.

Properties

Opens a dialog box with properties for the selected surface mount pipe component. Allows you to review the properties of the selected component and change the value assigned to a property.

Move From

Defines the origin of the move vector. If you do not define a starting point, the current location of the end feature is assumed to be the starting point.

Move To

Defines the termination point of the move vector.

Run

Specifies the name of the pipe run on which the component is placed.

Type

Displays the tag associated with the selected component. In addition, the **Type** list contains the tags associated with other surface mount components. Selecting an entry from the **Type** list replaces the selected component with one of a different tag.

Rotate

Rotates the surface-mounted component about the pipe interactively around the feature axis.

Angle

Defines the angle for rotating the component around the pipe.

What do you want to do?

- [Create a new pipe run \(on page 155\)](#)
 - [Create an arc pipe run \(on page 155\)](#)
 - [Create a new pipe run from a P&ID run \(on page 156\)](#)
 - [Route pipe across P&ID off-page connectors \(on page 156\)](#)
 - [Place components while routing pipes \(on page 157\)](#)
 - [Place splits while routing pipes \(on page 158\)](#)
 - [Route a sloped pipe run \(on page 158\)](#)
 - [Route a multi-sloped pipe run \(on page 160\)](#)
 - [Route a pipe run to a specific coordinate location \(on page 161\)](#)
 - [Route a pipe run at specified distance \(on page 162\)](#)
 - [Route a pipe run at specified distance and direction \(on page 162\)](#)
 - [Route a pipe run with an offset \(on page 163\)](#)
 - [Copy a pipe run \(on page 164\)](#)
 - [Extend an existing pipe run \(on page 164\)](#)
 - [Extend an existing arc pipe \(on page 164\)](#)
 - [Merge pipe runs \(on page 165\)](#)
 - [Choose a working plane \(on page 166\)](#)
 - [Select pipe run settings \(on page 167\)](#)
 - [Change the flow direction of a pipe run \(on page 167\)](#)
 - [Route a branch at a specific angle \(on page 163\)](#)
 - Route a pipe from R3D nozzle
 - [Convert turn feature to an arc \(on page 167\)](#)
 - [Place a tee from a P&ID \(on page 168\)](#)
 - [Place a nozzle from a P&ID \(on page 168\)](#)
 - [Model from a P&ID \(on page 169\)](#)
 - [Correlate existing equipment for use in an integrated environment \(on page 170\)](#)
 - [Correlate new equipment for use in an integrated environment \(on page 170\)](#)
 - [Update equipment for use in an integrated environment \(on page 170\)](#)
 - [Manually correlate multiple Smart 3D pipe runs/pipelines with a P&ID pipe run/pipeline \(on page 171\)](#)
 - [Compare design basis with the model \(on page 172\)](#)
 - Remove correlation with design basis
-

Create a new pipe run

1. Click **Route Pipe**  on the vertical toolbar.
2. Select the run starting point.

TIPS

- If you select a feature located at the end of an existing run, the software continues the run of the selected feature. Skip to step 5.
- If you select an equipment nozzle, a point in space, a tap, a branch port, or a point along a straight feature, the software prompts you to create a new pipe run.
- If you select an equipment nozzle that is correlated with P&ID design basis data, the software automatically determines which run should be connected.

3. On the **New Pipe Run** dialog box, type a name for the **Pipe Run**. If you do not type a name, the software automatically generates a name.

Select pipe run settings (on page 167)

4. Click **OK** to close the **New Pipe Run** dialog box.
5. Select points to define the route of your pipe run.
TIP You can use **PinPoint**, **Point Along**, and the SmartSketch3D relationship indicators when defining your pipe run.
6. Select the ending point of the pipe leg. Right-click to end routing the pipe run.

NOTES

- You can continue routing an existing run by selecting a run end feature or by selecting the run name from the list of available runs.
- If the piping specification that you selected has service limits defined, you must define at least one temperature value and one pressure value for the pipe run. Do this by selecting **Temperature and Pressure** from the **Category** option.

Create an arc pipe run

1. Click **Route Pipe**  on the vertical toolbar.
2. Click **Arc Routing**  on the horizontal ribbon.
3. Click **Start Point**  and click to set the run starting point.
4. On the **New Pipe Run** dialog box, type a name for the **Pipe Run**. If you do not type a name, the software automatically generates a name.

Select pipe run settings (on page 167)

5. Click **OK** to close the **New Pipe Run** dialog box.
TIP If you are connecting the arc pipe to an existing run, select its name from the **Run** box.
6. Type the **Arc radius** in the corresponding box.
7. Click **Center Point** , and click to set the run center point.

8. Click **End Point** , and click to set the run end point.
9. Type the **Arc angle** in the corresponding box.
10. Click **Finish** to place the arc pipe.

Create a new pipe run from a P&ID run

1. Click **SmartPlant > Retrieve** to retrieve the P&ID drawing that contains the run that you want to route. You can skip this step if the P&ID has already been retrieved.
2. Click **SmartPlant > View P&ID** to view the P&ID drawing that contains the run that you want to route.
3. Click **Route Pipe**  on the vertical toolbar.
4. In the **Run** list on the ribbon bar, select **<Select from P&ID>**.
5. Select the run to route from the P&ID drawing.
6. The **New Pipe Run** dialog box appears with properties populated from the design basis. Click **OK** to accept the properties given. This step saves the correlated run information and closes the **New Pipe Run** dialog box.
7. Select points to define the route of your pipe run.

• TIPS

- If process data was not defined on the P&ID, then you must manually type a temperature and pressure.
 - You can use PinPoint, Point Along, and the SmartSketch3D relationship indicators when defining your pipe run.
 - If you select an equipment nozzle that is correlated with P&ID design basis data, the software automatically determines which run should be connected.
8. Select the ending point of the pipe run. Right-click to end a pipe run that does not terminate in a nozzle or branch.

NOTE Your plant must be registered with the Smart 3D integrated environment to use this procedure.

Route pipe across P&ID off-page connectors

1. Click **SmartPlant > Retrieve** to retrieve the P&IDs that contain the runs to route. You can skip this step if the P&IDs have already been retrieved.
2. Click **SmartPlant > View P&ID** to view the P&ID that contains the first part of the run to route.
3. Select **All or Piping Runs** in the **Locate Filter**.
4. Click **Route Pipe**  on the vertical toolbar.
5. In the **Run** pull-down list on the ribbon bar, select **<Select from P&ID>**.
6. From the P&ID drawing, select the run to route.

7. The **New Pipe Run** dialog box appears with properties populated from the design basis. Click **OK** to accept the properties given. This step saves the correlated run information and closes the **New Pipe Run** dialog box.
8. Select points to define the route of your pipe run.

TIP You can use PinPoint, Point Along, and the SmartSketch3D relationship indicators when defining your pipe run.
9. Right-click to end a pipe run in space (not terminated on a nozzle or branch).
- NOTE** After routing, notice that the correlation color in the P&ID Viewer does not show a data match. This mismatch is because the second part of the run noted through the off-page connector has not yet been routed and correlated. The off-page connector displays the corresponding P&ID to find the matching connector.
10. Click **SmartPlant > View P&ID** to view the corresponding P&ID noted by the previous drawing.
11. Click **Route Pipe**  on the vertical toolbar.
12. In the Run pull-down list on the ribbon bar, select **<Select from P&ID>**.
13. Select the other side of the run to route from the corresponding P&ID.
14. The **New Pipe Run** dialog box appears with properties populated from the design basis. Click **OK** to accept the properties given, which saves the correlated run information and closes the **New Pipe Run** dialog box.
15. Route the run to the end of the first pipe run. Because the software places a weld when the two ends are connected, you should choose an appropriate location along the pipe run for the weld caused by the off-page connector. This prevents unnecessary welds from being created.

Place components while routing pipes

1. Click **Route Pipe**  on the vertical toolbar.
 2. Select the run starting point.
- TIPS**
- If you select a feature located at the end of an existing run, the software continues the run of the selected feature. Skip to step 5.
 - If you select an equipment nozzle, a point in space, or a point along a straight feature, the software prompts you to create a new pipe run.
3. On the **New Pipe Run** dialog box, type a name for the **Pipe Run**. If you do not type a name, the software automatically generates a name.
 4. Specify the pipe run settings. For more information, see *Select pipe run settings* (on page 167).
 5. Click **OK** to close the **New Pipe Run** dialog box.
 6. Select points to begin routing your pipe run.
 7. Click **Insert Component**  when you want to insert a component.
 8. Place the component. For more information, see *Insert a component*.

9. Select the ending point of the pipe run. Right-click to end a pipe run.

NOTE You can continue routing an existing run by selecting a run end feature or by selecting the run name from the list of available runs.

Place splits while routing pipes

1. Click **Route Pipe**  on the vertical toolbar.
2. Select the run starting point.

! TIPS

- If you select a feature located at the end of an existing run, the software continues the run of the selected feature. Skip to step 5.
- If you select an equipment nozzle, a point in space, or a point along a straight feature, the software prompts you to create a new pipe run.

3. On the **Pipe Run** dialog box, type a name for the **Pipe Run**. If you do not type a name, the software automatically generates a name.

Select pipe run settings (on page 167)

4. Click **OK** to close the **New Pipe Run** dialog box.
5. Select points to begin routing your pipe run.
6. Click **Insert Component**  when you want to insert a component.
Insert a component
7. Select the ending point of the pipe run. Right-click to end routing.

NOTE You can continue routing an existing run by selecting a run end feature or by selecting the run name from the list of available runs.

Route a sloped pipe run

1. Click **Route Pipe**  on the vertical toolbar.
2. Select the run starting point in an elevation view.
3. On the **New Pipe Run** dialog box, select the parent **Pipeline**.
4. In the **Name** box, type a name for the pipe run. If you do not type a name, the software automatically generates a name.
5. Select the **Minimum Slope** box, and then type the slope for the pipe run. For example, **2 deg** or **0.5in / 1.0ft**.
6. Click **OK** to close the **New Pipe Run** dialog box.
7. In the **Specify Slope Direction** dialog box, specify if you are routing from the high point or the low point of the pipe run.
8. Click **OK** in the **Specify Slope Direction** dialog box.
9. Select points to define the route of your pipe run.

! TIP You can use PinPoint, Point Along, and the SmartSketch3D relationship indicators when defining your pipe run.

10. Select the ending point of the pipe run. Right-click to end routing.

NOTES

- You can unlock the slope on the ribbon to temporarily override the slope. For example, you will need to unlock the slope to model a vertical drop in the pipe run.
- If the piping specification that you selected has service limits defined, you must define at least one temperature value and one pressure value for the pipe run. Do this by selecting **Temperature and Pressure** from the **Category** option.
- To modify the slope of a pipe run, delete the pipe run and create a new pipe run with the modified slope value.

Adjust the slope to keep the pipe run within the slope tolerance

When you move sloped pipe run components, connected components can move out of the minimum slope tolerance. This often happens when you move a loop or change the slope tolerance on an existing pipe run. To adjust the components so that they are within the minimum slope tolerance, use the following procedure:

1. Select the turn feature (typically an elbow) to move. For example, you may need to move an elbow so that the attached pipe slope is within the slope tolerance.

2. Click **Modify Slope** .

*The **Modify Slope** dialog box displays. For more information, see [Modify Slope Dialog Box](#).*

3. Select the pipe run to change.
4. Select a slope from the list that puts the component within the minimum slope tolerances.
5. Click **OK**.

Smart 3D changes the slope of the component.

 **TIP** You must repeat this procedure for each component that needs to change.

Adjust the Default Change of Direction rule for sloped piping

 **IMPORTANT** The Catalog must contain appropriate bend angles in the **Default Change of Direction** rule for Smart 3D to correctly place turn fittings for sloped pipe runs.

1. Click **Task > Catalog**.

Catalog opens.

2. Navigate to **Default Change of Direction Rule**.

3. Adjust the **Bend Angle From** and **Bend Angle To** values as necessary so that the bend angles account for the slope variation.

nPlant Rules\Default Change of Direction Rule			
	Bend Angle From	Bend Angle To	Functional Short Code
▶	10.00 deg	44.50 deg	c45 Degree Direction Char
	44.50 deg	45.50 deg	45 Degree Direction Char
	45.50 deg	88.50 deg	90 Degree Direction Char
◀	88.50 deg	93.00 deg	90 Degree Direction Char

4. Bulkload any changed bend angles. For more information, see [Loading Reference Data into the Catalog](#) in the [Reference Data Guide](#).
5. Click **Task > Piping**.

Piping opens.

6. Route the sloped pipe.

Smart 3D calculates the appropriate turn fittings for the sloped pipe run.

! TIPS

- When routing a sloped pipe, use a slope value that is larger than the **Minimum Slope** for the pipe run to avoid *Invalid Slope Angle To-Do-Record* (TDR). The software compares design slope and minimum slope of the pipe run. If there is a difference between the values caused by any modification, the software generates a TDR.
- If you route the pipe run and allow Smart 3D to automatically place the elbows, Smart 3D can calculate modifications to the pipe run later in the design cycle. Make sure that the elbows you use in sloped piping are trimmable (that is, you can change the bend angle).

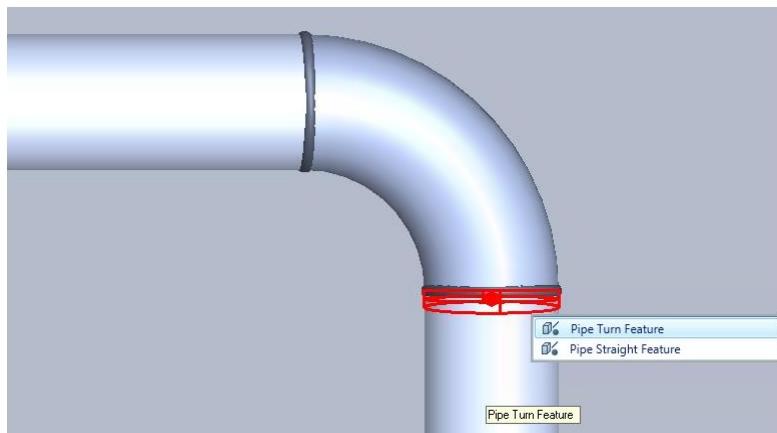
Remove small miter fittings

Small miters form when you place 90 degree elbows on sloped pipes and then route pipe from the end of the elbow instead of letting Smart 3D create elbows based on the angle between the pipes.

NOTE Sloped piping typically needs trimmable elbows. If there are no trimmable elbows in the Catalog, Smart 3D cannot adjust the angle for sloped piping.

Use the following procedure to remove these small miter fittings:

1. Select the miter fitting.



The angle for the small miter fitting displays in the **Angle 1** box.

2. Type **0** in the **Angle 1** box.

Smart 3D removes the miter and adjusts the angle and orientation of the fitting to accommodate the sloped piping.

Route a multi-sloped pipe run

1. Click **Route Pipe**  on the vertical toolbar.
2. Select the run starting point in an elevation view.
3. On the **New Pipe Run** dialog box, select the parent **Pipeline**.

4. In the **Name** box, type a name for the pipe run. If you do not type a name, the software automatically generates a name.
5. Select the **Minimum Slope** box, and then type the slope for the pipe run. For example, **2 deg** or **0.5in / 1.0ft**.
6. Click **OK** to close the **New Pipe Run** dialog box.
7. In the **Specify Slope Direction** dialog box, specify if you are routing from the high point or the low point of the pipe run.
8. In the **Specify Slope Direction** dialog box, select **Run contains multiple slope orientation** to indicate that the pipe run will slope both up and down.
9. Click **OK** on the **Specify Slope Direction** dialog box.
10. Select points to define the route of your pipe run.

TIP You can use PinPoint, Point Along, and the SmartSketch3D relationship indicators when defining your pipe run.
11. When you are finish routing in that particular direction (for example, sloping down). Right-click to end routing.
12. Click **Route Pipe**  again.
13. In the **Run** box on the ribbon, select **<New/ Continue Run>**.
14. Select the pipe end feature where you stopped in step 11.
15. In the **Specify Slope Direction** dialog box, specify the other direction.
16. Click **OK** on the **Specify Slope Direction** dialog box.
17. Select point to define the route of your pipe run.
18. Repeat steps 11 through 17 until you have completed the pipe run route.

IMPORTANT The **Run contains multiple slope orientations** option on the **Specify Slope Direction** dialog box indicates that the pipe run slopes both up and down. After you specify that a pipe run has multiple slope orientations, you cannot clear the selection. You should only route pipe runs with multiple slope orientations when it is absolutely required. In addition, pipe runs with multiple slope orientations may behave unexpectedly during modification operations.

Route a pipe run to a specific coordinate location

1. Click **Tools > PinPoint**.
2. Select the coordinate system that contains the location to which you want to route.
3. Select the **Rectangular Coordinates**  option on the **PinPoint** ribbon.
4. Click **Route Pipe**  on the vertical toolbar.
5. Select the run starting point.
6. Define the pipe run properties on the **New Pipe Run** dialog box, and then click **OK**.
7. Select the **Set Target to Origin**  option on the **PinPoint** ribbon to move the **PinPoint** target to the specified coordinate system's origin.

8. In the **PinPoint** ribbon, type the easting, northing, or elevation coordinates to which you want to route.
9. Click in the view to route the pipe run to the specified point.

NOTE If the piping specification that you selected has service limits defined, you must define at least one temperature value and one pressure value for the pipe run. Do this by selecting **Temperature and Pressure** from the **Category** option.

Route a pipe run at specified distance

1. Click **Tools > PinPoint**.
2. Select the **Relative Tracking**  option on the **PinPoint** ribbon.
3. Select the **Rectangular Coordinates**  option on the **PinPoint** ribbon.
4. Click **Route Pipe**  on the vertical toolbar.
5. Select the run starting point.
6. Define the pipe run properties on the **New Pipe Run** dialog box, and then click **OK**.
7. In the **PinPoint** ribbon, type the easting, northing, or elevation distance (from the **PinPoint** target) to route the pipe run.
8. Click in the view to route the pipe run to the specified point. The software moves the **PinPoint** target to the new location.
9. In the **PinPoint** ribbon, type the easting, northing, or elevation distance to route the pipe run.
10. Continue defining points as needed.
11. Select the ending point of the pipe run. Right-click to end a pipe run.

NOTE If the piping specification that you selected has service limits defined, you must define at least one temperature value and one pressure value for the pipe run. You do this by selecting **Temperature and Pressure** from the **Category** option.

Route a pipe run at specified distance and direction

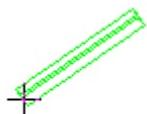
1. Click **Tools > PinPoint**.
2. Select the **Relative Tracking**  option on the **PinPoint** ribbon.
3. Select the **Spherical Coordinates**  option on the **PinPoint** ribbon.
4. Click **Route Pipe**  on the vertical toolbar.
5. Select the run starting point.
6. Define the pipe run properties on the **New Pipe Run** dialog box, and then click **OK**.
7. In the **PinPoint** ribbon, type the absolute distance and direction to route.
8. Click in the view to route the pipe run to the specified point. The software moves the **PinPoint** target to the new location.
9. Continue defining points as needed.

10. Select the ending point of the pipe run. Right-click to end a pipe run.

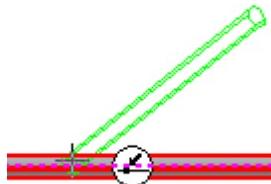
NOTE If the piping specification that you selected has service limits defined, you must define at least one temperature value and one pressure value for the pipe run. Do this by selecting **Temperature and Pressure** from the **Category** option.

Route a branch at a specific angle

1. Click **Route Pipe**  on the vertical toolbar.
2. Select the branch run starting point (the end not connected to the header).



3. Select a point on the header at approximately the correct angle and direction that you want.



4. In the **Locate Filter**, select **Piping Features**.
5. Select the Pipe Along Leg Feature where the branch connects to the header. You will probably need to use Quick Pick in order to select the correct feature.
6. In the **Angle 1** box on the ribbon, type the actual angle that you want the branch to connect to the header.

NOTE If the piping specification that you selected has service limits defined, you must define at least one temperature value and one pressure value for the branch. Do this by selecting **Temperature and Pressure** from the **Category** option.

Route a pipe run with an offset

1. Click **Route Pipe**  on the vertical toolbar.
2. Select the run starting point.
3. Define the pipe run properties on the **New Pipe Run** dialog box, and then click **OK**.
4. From the **Offset** option, select **Set Offset Reference**.
5. Select the option to use from the **Measured from** field.
6. Type the offset distance to use in the **Offset** box.
7. Click **OK** on the **Set Offset Reference** dialog box.
8. Select the appropriate route plane. The offset glyph does not appear if you do not set a plane.

9. Move the cursor over the object in the model from which you want to measure the offset until the object is added to the SmartSketch3D locate list. This glyph  appears.
10. Move the cursor until the offset line and glyph  appear, and then click to route the pipe run.
11. Select the ending point of the pipe run. Right-click to end routing.

NOTE If the piping specification that you selected has service limits defined, you must define at least one temperature value and one pressure value for the pipe run. You do this by selecting **Temperature and Pressure** from the **Category** option.

Copy a pipe run

1. Click **Select**  on the vertical toolbar.
2. Select **Piping Runs** in the **Locate Filter**.
3. Select the pipe run to copy.
4. Click **Edit > Copy**.
5. Select a *from* point for the copied objects.
6. Click **Edit > Paste**.
7. Clear the **Paste in place** option if it is selected.
8. Identify a location in the model for the copied pipe run.

NOTE The copied pipe run must be collinear a pipe run end or nozzle, the system automatically connects the two. If you are copying a branch pipe run, then the branch end must be orthogonal to the header pipe run. If the copied pipe run is not collinear or orthogonal to the pipe run, the software does not make a connection.

Extend an existing pipe run

1. Click **Route Pipe**  on the vertical toolbar.
2. Select the end feature from which to extend the pipe run.
3. Route the pipe run as needed.

Extend an existing arc pipe

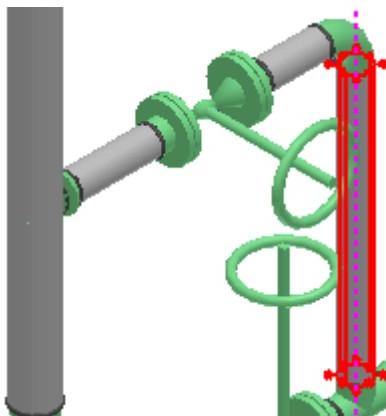
1. Click **Route Pipe**  on the vertical toolbar.
2. Click **Arc Routing**  to change the route mode from straight to arc.
3. Select the end feature from which to extend the arc pipe run.
4. Select a center point to specify the direction and normal for the arc.
5. Type the arc radius. If you need to route the arc with the same radius, select **Maintain Same Radius** in the **Arc Radius** drop-down list.

The center point is adjusted according to the radius value.
6. Select the end point.

7. In the **Arc Angle**, key in the required angle.
8. Route the arc pipe as needed.

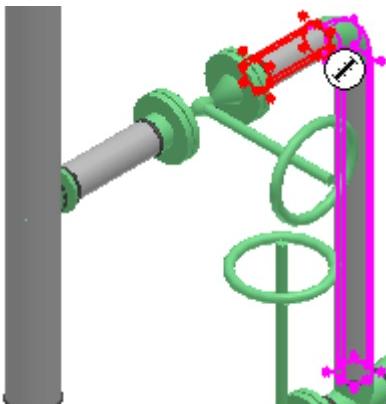
Merge pipe runs

1. Click **Select**  on the vertical toolbar.
2. Select **Piping Features** in the **Locate Filter**.
3. Select the end feature of the pipe run you want to merge (delete).



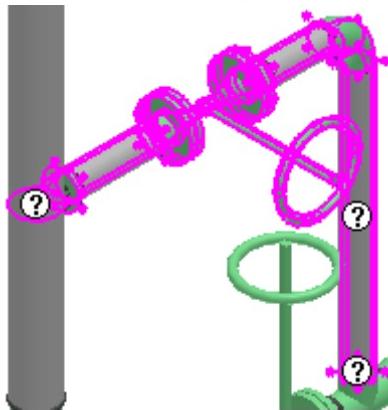
4. Press and hold the SHIFT key.
5. Select the end feature at the other end of the pipe run you want to merge.

The software automatically selects all the features between the two features that you selected.



6. In the **Run** box on the ribbon, select **<Select Graphically>**.
7. In a graphic view, select the pipe run to which you want the selected pipe features assigned.

The software re-assigns the selected pipe features to the newly identified pipe run.



8. Select **Piping Runs** in the locate filter.
9. In the **Workspace Explorer**, find the now empty pipe run and delete it.

TIP If other objects, such as pipe supports, are still assigned to the "empty" pipe run (the run with no piping features), you will need to move these item to the merged pipe run prior to deleting the empty pipe run.

NOTE If the flow direction of the newly merged pipe run is corrupt, you can use the **ValidateFlowDirCmd.ValidateFlowDir** custom command to search for and fix corrupt flow directions in your model. In case of flow direction inconsistency, a warning message is displayed. Contact support with this message.

Choose a working plane

1. Click **Plane** on the ribbon.
2. Select the routing plane for your pipe run.

Plane Options

- **Plan Plane** - Defines the work surface as the XY plane at the depth of the active end. You also can press CTRL+1 to select this option.
- **Elevation Plane: East-West** - Defines the work surface as the XZ plane. You also can press CTRL+2 to select this option.
- **Elevation Plane: North-South** - Defines the work surface as the YZ plane. You also can press CTRL+3 to select this option.
- **Plane by Turn/Branch** - Defines the work surface as the plane defined by an existing turn or branch. You select the turn or branch to set the plane. You also can press CTRL+4 to select this option.
- **Plane by Three Points** - Defines the work surface using three points that you define. You also can press CTRL+5 to select this option.
- **No Plane** - Clears any work surfaces. The software does not project points that you place to any plane. You also can press CTRL+6 to select this option.

NOTE When you select a routing plane, the software highlights the plane in the model.

Select pipe run settings

1. On the **New Pipe Run** dialog box, choose the pipeline for the new run in the **Pipeline** box.
TIP The **Pipeline** box lists up to the last ten selected pipelines. Choosing the **More** option at the bottom of the list allows you to browse all pipelines in the model.
2. Optionally, in the **Name** box, type the name of the new pipe run that you are creating.
3. Set the specification of the new pipe run in the **Specification** box.
4. In the **Nominal Diameter** box, select the NPD for the pipe run.
5. Set other pipe run properties as needed.
6. Click **OK** to return to the **Route Pipe** command.

NOTES

- Use the **Category** option to view more properties that you can set for the pipe run.
- If the piping specification that you selected has service limits defined, you must define at least one temperature value and one pressure value for the pipe run. Do this by selecting **Temperature and Pressure** from the **Category** option.

Change the flow direction of a pipe run

1. Click **Select**  on the vertical toolbar.
2. Select **Piping Runs** in the **Locate Filter**.
3. Select the pipe run for which you want to change the flow direction.
4. Click one of the flow direction indicators that appear on the pipe run.
5. Select a new flow direction on the **Flow** dialog box.

NOTES

- The flow directional indicators are listed below:
 -  Bi-directional
 -  Upstream
 -  Downstream
 -  No flow
 -  Undefined
- You also can click **Properties**  on the ribbon to edit the flow direction property of a run.

Convert turn feature to an arc

1. Select a pipe turn feature.
2. Right-click on the turn feature.
3. On the right-click menu, select **Convert Turn to Arc**.

NOTE After you convert a turn feature to arc, you can revert to turn feature. Right-click the arc feature, and select **Convert Arc to Turn** on the right-click menu.

Place a tee from a P&ID

1. Click **SmartPlant > Retrieve** to retrieve the P&ID drawing that contains the pipe runs for that branch. You can skip this step if the P&ID has already been retrieved.
2. Click **SmartPlant > View P&ID** to view the P&ID drawing that contains pipe runs.
3. Review the P&ID to determine where you need to insert the tee or branch in the model. Specifically, you need to identify the header and branch pipe runs.
4. Click **Insert Component**  on the vertical toolbar.
5. Select the header run in which to insert the tee or other branch component.
6. Select the component type and the option in the **Type** and **Option** boxes.
7. Position the component on the header pipe run.
8. Click **Finish**.
9. Using the **Route Pipe**  command, route the branch pipe run into the branch component that you just placed on the header pipe run.

TIP As you model and branch into a header line, a tee is automatically generated by the software.

Place a nozzle from a P&ID

1. Click **SmartPlant > Retrieve** to retrieve the P&ID that contains the nozzle to place. You can skip this step if the P&ID has already been retrieved.
2. Click **SmartPlant > View P&ID** to view the P&ID that contains the nozzle to place.
3. In the P&ID, select the nozzle to place in the model.
4. Click **Place Nozzle**  on the vertical toolbar.
5. Select the equipment or designed equipment object on which to place the nozzle.

TIP You can either select the shape in a graphic view, or you can select it in the **Workplace Explorer**.

The **Nozzle Properties** dialog box appears.

6. Verify that the property values defined on the **Occurrence** tab are correct as compared to the nozzle report.
7. On the **Location** tab, specify the placement type and type values for the location parameters as needed.
8. Click **OK**.

The **Nozzle Properties** dialog box closes, and you return to the model with the nozzle placed.

9. Click **SmartPlant > Compare Design Basis**, and verify the correlation status of the nozzle in the model.

10. If necessary, click **Copy properties from design basis**, and then click **Update** to transfer data in the P&ID to match the 3D model object.

NOTES

- The software automatically sets all mapped nozzle properties in the 3D model as defined by the currently selected P&ID nozzle.
- After the nozzle is placed in the 3D model, it can be moved without affecting the correlation. If it is deleted, it does not delete the P&ID design basis object.
- Correlation is a relationship between an object in the 3D model and the corresponding object in the P&ID. For example, a nozzle in the 3D model is related to a nozzle in the P&ID.
- The occurrence properties of the nozzle object in the 3-D model that are not correlated with corresponding properties in the design basis object (that is, the nozzle in the P&ID) can be edited without changing the correlation status.

Model from a P&ID

1. Click **SmartPlant > Retrieve** to retrieve the P&ID that contains the pipe to place. You can skip this step if the P&ID has already been retrieved.
 2. Click **SmartPlant > View P&ID** to view the P&ID that contains the pipe to place.
 3. In the P&ID, select the point from which to start modeling.
The point highlights in the model.
 4. Click **Tasks > Piping** to start the Piping task if necessary.
 5. Click **Route Pipe** .
- If the object from which you are routing is already correlated, the **New Pipe Run** dialog box displays with the parameters associated with the pipe run.*
6. Click **OK** on the **New Pipe Run** dialog box.
 7. Route the pipe to meet your requirements.

NOTES

- You can insert components while you are routing pipe. With the **Route Pipe**  command active, click **Insert Component** , and then select the component from the P&ID. Click **Finish** on the **Insert Components** ribbon bar. The software inserts the component on the end of the run and then continues with the **Route Pipe**  command. Do not right-click to reset the command, or you must restart the command.
- You can insert components after you route pipe. Click **Insert Component** , select the run, and then select the component from the P&ID. Click **Finish** on the **Insert Components** ribbon to place the component in the model. If the attribute information has already been retrieved, the software places that component. If the attribute information has not been retrieved, the software displays an error message telling you that the component cannot be located.

Correlate existing equipment for use in an integrated environment

If the nozzles exist on the equipment before you correlate, then the software attempts to correlate the nozzles automatically. Otherwise, you must correlate existing equipment in two processes. First, correlate the body. Then, correlate the nozzles in a separate process.

Correlate the Body

1. Select **Correlate with Design Basis**.
2. Select the main equipment body.
3. Select the equipment on the P&ID.

Correlate the Nozzles

1. Select **Correlate with Design Basis**.
2. Select a nozzle on the equipment.
3. Select the corresponding nozzle on the P&ID.

NOTE If the nozzle names in the 3D model and the names identified in the P&ID match, then the nozzles correlate to the correct state. If there are any discrepancies, you can view them using the **SmartPlant > Compare Design Basis** command.

Correlate new equipment for use in an integrated environment

1. Select the equipment from the P&ID.
2. Select **Place Equipment**  to create the equipment folder, and select the matching equipment by type using the catalog.
3. Place the shape, and select the equipment parent.
4. Select the nozzle from the P&ID.
5. Click **Place Nozzle** .
6. Select the designed equipment parent for the nozzle.
7. Position the nozzle on the equipment.

NOTE You must type all of the size, end preparation, termination class, and rating practice information for the first nozzle that you place. The software reads all subsequent nozzle information directly from the P&ID.

Update equipment for use in an integrated environment

1. Click **Compare Design Basis**.
2. Select the equipment folder from the **Workspace Explorer**, or select the symbol from the P&ID.

3. Click **Update**.

NOTES

- Updating adjusts all of the nozzles associated with the main body as well as the equipment body itself. The nozzles and the equipment appear highlighted in the **Workspace Explorer**. If they are not highlighted then you can select the equipment in the **Workspace Explorer** and choose **Select Nested**. Then, select **SmartPlant > Compare Design Basis**. Select **Update** to update the equipment and all associated nozzles.
- If you change dimensions or names of a nozzle, then you must update that nozzle separately.

Manually correlate multiple Smart 3D pipe runs/pipelines with a P&ID pipe run/pipeline

If a P&ID pipe run or pipeline is split into multiple pipe runs or pipelines in Smart 3D, you can use the following procedure to manually correlate these multiple Smart 3D piping objects to the single P&ID pipe run or pipeline.

 **NOTE** If you are correlating pipelines, ensure to set the filter to **Pipelines**; likewise, for pipe runs, set the filter to **Piping Runs**. This is because you cannot select pipelines in P&ID and the software uses the filter to determine what kind of piping objects you are correlating.

1. Click **SmartPlant > Retrieve** to retrieve P&ID data into the software.
2. Open the P&ID in the **P&ID File Viewer**.
3. Click **SmartPlant > Correlate with Design Basis**.
4. Select an object in the 3D model that you want to correlate.
5. In the **P&ID File Viewer**, select the object that you want to correlate.

The software detects whether the P&ID object is already correlated to one or more 3D object. When you see the following message, click **Yes** to continue.

Selected Design Basis object is already correlated to another 3D object. Are you sure you want to correlate more than one 3D object the same Design Basis object?

 **NOTE** If you click **No**, the software un-correlates the existing correlated run, and then correlates the new run.

6. Review the **Correlate with Design Basis** dialog box, set correlating options as needed, and click **Update**. For more information, see *Correlate with Design Basis Dialog Box* (on page 119).
7. Review discrepancies between the Smart 3D piping object and the design basis using the **SmartPlant > Compare Design Basis** command.

 **TIP** The **Compare Design Basis** command helps you to determine if there are missing correlations to the P&ID piping object. For more information, see *Compare Design Basis with the Model* (on page 137).

Repeat steps 3 through 6 to correlate more Smart 3D objects to the P&ID piping object. When all related objects in the 3D model are correlated with the P&ID piping object, the **Correlation Status** property of these 3D objects shows **Correlated with data consistency**.

Compare design basis with the model

The **Compare with Design Basis** command allows you to resolve discrepancies between an object in the 3D model and the design basis.

1. Click **SmartPlant > Retrieve** to retrieve data into the software.
2. Click **SmartPlant > View P&ID** to open the P&ID that contains the data that you retrieved.
3. Select an object on the P&ID or in the model.
4. Click **SmartPlant > Compare Design Basis**.
5. Review the **Properties** tab for highlighted objects that have a discrepancy between the P&ID and the three-dimensional model. Objects that do not match appear in a different background color (red).
6. Review the **Topology** tab to check for differences in shapes between the P&ID and the 3D model. This tab is available only for objects that support correlation.
!TIP When you select a pipe run, the **Topology** tab indicates objects that are correlated and in the same order on the pipe run, as well as objects that are correlated and not in the same order on the pipe run.
7. Click **Close** if you do not want to update the properties from design basis.

-OR-

After you correct the errors that cause the discrepancy, click **Update** on the **Compare with Design Basis** dialog box to transfer data from the design basis object to the 3D model object and update properties that are out-of-date. The **Design Basis Value** and the **Model Value** columns change to show the new values.

!TIPS

- Clicking **Update** changes the property values. You can selectively update properties by selecting associated check boxes. For more information see, *Properties Tab (Compare with Design Basis Dialog Box)* (on page 135).
 - For certain exceptions, the software does not process an update. For example, an object that is not mapped with properties is not updated.
8. When you have finished your review, click **Close**.

View P&IDs in Smart 3D

SECTION 5

Revising

The document revision process is separate from the publishing process, making it possible to revise a document locally and save it to the database without re-publishing it. The **Revise** command is available on the right-click menu for drawings, reports, and 3D Model Data documents. In an integrated environment, all revisions are handled by SmartPlant Foundation.

Revising and publishing are two separate actions. You specify the document revision using the **Revise** command, which creates a Revision for the document with Major and Minor set, depending on the revision schema selected. If you are working in an integrated environment, you can modify the other revision information on the document.

After setting the revision number, right-click the document and select **Properties**. Select the **Revision** tab and edit the **Revision** fields. You should update documents to include any new title block information.

You can now re-publish the document with the new revision information.

NOTES

- You can use the **Revise** command if your model has been registered using the SmartPlant Registration Wizard. For more information on registering, see the *Project Management User's Guide* under **Help > Printable Guides**.
- If the drawing document that you are looking at in the **Detail View** has a yellow icon (for example: ) , the drawing document is a version 6.1 legacy Snapshot drawing. You should use the **Tools > Convert Legacy Snapshots** command to convert this document to a Composed Drawing for use in the current version of the software. If you do not convert the legacy snapshot drawing, you cannot perform edit operations on the drawing, including update, revise, and publish.

See Also

Publishing Documents (on page 193)

Revise (on page 173)

Revise a document (on page 174)

Revise

Revising and publishing are two separate actions. You specify the document revision using the **Revise** command, which creates a Revision for the document with Major and Minor set, depending on the revision schema selected. If you are working in an integrated environment, you cannot modify the Major and Minor revision data, but you can modify the other revision information on the document.

After reserving the revision number, right-click the document and select **Properties**. Select the **Revision** tab and edit the **Revision** fields. You should update documents to include any new title block information.

You can now re-publish the document with the new revision information.

Revise Dialog Box (on page 174)

NOTE You can use the **Revise** command if you have registered your model using the SmartPlant Registration Wizard. For more information on registering, see the *Project Management User's Guide* under **Help > Printable Guides**.

Revise a document

You can revise drawings, reports, and 3D Model Data documents if you have registered your model using the SmartPlant Registration Wizard. For more information about using the SmartPlant Registration Wizard, see the *Project Management User's Guide* under **Help > Printable Guides**.

1. Right-click a document and select **Revise**. The **Revise** dialog box displays.

! TIPS

- You can also multi-select documents in the **Detail View**, or you can select a folder in the **Management Console** hierarchy to select all of the documents within the folder if they all have the same revision level.
- If the **Revise** command is not available on the shortcut menu, check the properties on the document. Right-click the document and select **Properties**. Go to the **WBS** tab and make sure that you have a **Document type** and **Discipline** set for the document. For more information, see *Set properties for publishing documents* (on page 197).

2. For a new document or a document that does not yet have a defined revision scheme, select the revision scheme that you want to use from the **Revision Scheme** list.

NOTE Only revision schemes that are applicable to the configuration (plant) or classification (document type) are available in the shortcut menu. The revision schemes related to a configuration or classification are not available for any other configurations or classifications. If none of the revision schemes are related to the configuration or classification, then all revision schemes are available unless they are related to any other configuration or classification. For more information on revision scheme configuration, see *Configuring Different Revision Scheme Strategies* in the *How to Configure Document Management* guide.

3. In the **Revise in Tool** section, select the next available major and minor revision numbers.
4. Click **OK**. The document is saved to the model database. The command creates a revision record by adding it to the document Revision properties. The command also reserves the revision number.
5. Right-click the document and select **Properties**.
6. Go to the **Revision** tab and edit the values in the new revision row.
7. Update the document to update any document property title block information. For more information, see *Updating Documents* (on page 176).
8. Re-publish the document. The stored document is not updated until you publish it.

Revise Dialog Box

Allows you to revise a document in the database of the authoring tool without publishing it.

NOTE Fields with a shaded background are read-only fields and cannot be edited.

Selected documents

Displays a list of the documents selected to be revised or for which you want to reserve a set of revision numbers. You populate this list by selecting documents before you use the **Revise** command.

Engineering Tool

Opens an authoring tool-specific dialog box that allows you to select documents to add to the **Selected documents** list. This option is not available in Smart 3D.

Revision Scheme

If you have selected a new document or a document for which no revision scheme has been selected, choose the revision scheme to be applied from the list of available options. Only revision schemes that are applicable to the configuration (plant) or classification (document type) are available in the shortcut menu. The revision schemes related to a configuration or classification are not available for any other configurations or classifications. If none of the revision schemes are related to the configuration or classification, then all revision schemes are available unless they are related to any other configuration or classification. For more information on revision scheme configuration, see *Configuring Different Revision Scheme Strategies* in the *How to Configure Document Management* guide.

Current Revision in Tool Major

For existing documents, this field displays the current major revision of the document, as defined in the authoring tool, in a read-only format. For new documents, this field is empty.

Current Revision in Tool Minor

For existing documents, this field displays the current minor revision of the document, as defined in the authoring tool, in a read-only format. If the revision scheme does not use minor revision, or if the selected document has not yet been revised, this field is empty.

Revise in Tool Major

From this list box, choose the next available major revision number for the document to revise it locally, without publishing the new information. If you do not want to revise the document at this time, in other words, if you want to reserve revisions numbers without revising the document, leave this field empty.

Revise in Tool Minor

From this list box, choose the next available minor revision number for the document to revise it locally, without publishing the new information. If you do not want to revise the document at this time, in other words, if you want to reserve revisions numbers without revising the document, leave this field empty. If minor revisions are not supported for the document, no options are available in this list.

★ IMPORTANT If you do not use the **Minor** field when revising a document for the first time, the minor revision option will never be available for that document for future revisions.

Next Major

Updates the document revision to the next major revision.

Updating Documents

Updating documents increases productivity because you can easily keep deliverables current. It is important to understand the different update capabilities.

NOTES

- You must install the **SmartPlant Schema Component** to update documents. For more information, see the *Intergraph Smart™ 3D Installation Guide* available from **Help > Printable Guides**.
- If the drawing document you are looking at in the **Detail View** has a yellow icon (for example: ), the drawing document is a version 6.1 legacy Snapshot drawing. You should use the **Tools > Convert Legacy Snapshots** command to convert this document to a Composed Drawing for use in the current version of the software. If you do not convert the legacy snapshot drawing, you cannot update, revise, or publish the drawing.
- Any time you update a 3D model document, the software generates a single log file listing status information and any errors encountered during the process. The log file location is %TEMP%\EFUpdateCache\[3D Model ID]\[3D Model ID].log.

Refreshing Document Contents

The **Refresh** command on the shortcut menu for a Console hierarchy item allows you to see which documents are out-of-date. For more information, see *Refresh (Shortcut Menu)* (on page 176).

Updating Documents Using Batch Processing

The **Batch** command queries the model to regenerate a single document or multiple documents. For volume and composed drawings, if you have edited the previous copy of the drawing (for example, by moving a label), the software remembers those changes and re-creates them. If batch processing is configured for the selected drawings, the update is performed on the Batch Server.

For more information, see Batch Processing - Intergraph Smart Batch Services.

See Also

Refresh document status (on page 177)

Refresh (Shortcut Menu)

Compares the date of the last update of the document with the modification date in the model for any object that has a *positive* (can be seen) resymbolization in the drawing.

This command is not available until you generate documents. You can access this command by right-clicking an item in the **Management Console** hierarchy or in the **Detail View** and selecting **Refresh** on the shortcut menu. The software updates the status for all the expanded items within the parent node.

 **NOTE** The **Refresh** command is not available for Spreadsheet Report documents. A Spreadsheet Report document is regenerated each time you update or print the report document. You can refresh the contents of a folder that contains reports.

For out-of-date documents  , the command behavior implies the following:

- If the object is hidden entirely and is inside the drawing volume, but the style does not resymbolize the hidden lines, the object does not participate in the "out-of-date" definition.
- The modification date used for the object in the model can be for any property even if this property has no impact on the graphic. This means that a drawing could be considered out-of-date even though the graphic is up-to-date. For example, the approval status does not affect graphics. However, the view style you are using for your drawing can use a filter that sets approved objects to a specific color. A drawing document displays with an out-of-date definition because of a change to the approval status.
- Objects participating indirectly in the graphic as labels do not participate in the out-of-date definition. This means that, in rare cases, a label may be out-of-date on a drawing that is shown as up-to-date.

NOTES

- To refresh the **Management Console** to reflect changes made to *loaded* (expanded) tree view items, use the **View > Refresh** command.
- You can also use the **Batch > Refresh** command on the shortcut menu to perform your refreshes on the batch server. **Batch > Refresh** is not available for Spreadsheet Report documents.

Refresh document status

1. Right-click any item in the **Management Console** or in the **Detail View**.
2. On the shortcut menu, click **Refresh**. The software checks the model for any differences. The drawing icons change to reflect the status of the documents compared to the model.

 **NOTE** After refreshing a folder or component, you can synchronize it with the model by right-clicking the item and then selecting **Update** (drawings by rule) or **Update Now** on the shortcut menu.

See Also

- Refresh (Shortcut Menu)* (on page 176)
Updating Documents (on page 176)

Update Now

Updates a single document or multiple drawing documents whether or not they are out-of-date. This command is available when you right-click on:

- A folder or component in the **Management Console**. All drawings in all components within the folder are updated.
- A component in the **Management Console**. All drawings in the component are updated.
- One or more documents in the **Detail View**. The selected drawings are updated.

This command works on your local computer regardless of the batch configuration.

For volume drawings, the **Update Now** command is not available until you place drawing volumes for a volume component in the Space Management task. For composed drawings, this command is not available until you create the drawings in a 3D task through **Tools > Drawing**

Console. For reports, this command is not available until you create the report by choosing a report template.

NOTES

- If the software encounters a problem before or during the drawing update, it stops updating, displays either an error status or error message, and saves the errors to the log file. For more information, see *Conditional Drawing Update* (on page 184).
- The software preserves many of the modifications you make between regenerations of volume drawings. For example, if you annotate a volume drawing and then regenerate it, your annotations still display on the updated drawing.
- Documents created automatically in a Drawings by Rule component are automatically deleted by updating the component if the document no longer contains views.
- If the software cannot make a SmartPlant Foundation server connection when updating 3D Model Data documents, you are prompted to provide a valid login and password.
- If you place drawing property labels on a template, generate a drawing, move the labels on the drawing, and then update the drawing, the software remembers the new position of the labels on the drawing.

What do you want to do?

- *Update all drawings in a folder or a component* (on page 178)
- *Update a report* (on page 178)
- *Update a single drawing* (on page 179)
- *Insert a note at a precise place on an isometric drawing* (on page 179)

Update all drawings in a folder or a component

 **NOTE** Before you update a folder or a component, you can refresh its documents to determine which documents are out-of-date. For more information, see *Refresh document status* (on page 177). You do not have to refresh before updating, but it can be helpful to determine which documents are out-of-date.

1. Right-click a folder or a component in the hierarchy. If you select a component, it must contain existing drawings or reports. If you select a folder, it must contain a component with existing drawings or reports.
2. On the shortcut menu, click **Update Now**.

*The icons for the out-of-date documents change to show they are updated. If the Batch Server is configured, the command displays the **Drawing Batch** dialog box.*

For more information, see Batch Processing - SmartPlant Batch Services.

 **NOTE** You can update an individual document by right-clicking the document and selecting **Update Now** on the shortcut menu.

Update a report

1. Right-click a report document.

2. On the shortcut menu, select **Batch > Update** to update the document on the batch server now or create a schedule to run the batch job. Alternatively, select **Update Now** to update locally.

The icon for the out-of-date document changes to show it is updated ✓.

3. If the batch server is configured, the **Drawings Batch** dialog box displays.

Batch Processing - SmartPlant Batch Services

NOTE When using the **Batch > Update** command and batch processing is configured for the selected document, the update is performed on the Batch Server. If batch processing is not configured, the command behaves the same as the **Update Now** command, performing a complete regeneration of the entire drawing on the local machine.

Update a single drawing

1. Right-click a document.
2. On the shortcut menu, select **Batch > Update** to update the document on the batch server now or create a schedule to run the batch job. Alternatively, select **Update Now** to update locally.

The icon for the out-of-date document changes to show it is updated ✓.

3. If the batch server is configured, the **Drawings Batch** dialog box displays.

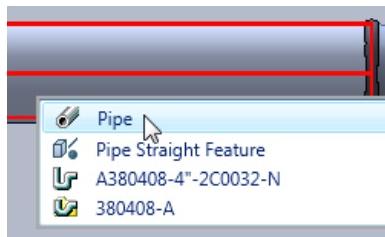
Batch Processing - SmartPlant Batch Services

NOTE When using the **Batch > Update** command and batch processing is configured for the selected document, the update is performed on the Batch Server. If batch processing is not configured, the command behaves the same as the **Update Now** command, performing a complete regeneration of the entire drawing on the local machine.

Insert a note at a precise place on an isometric drawing

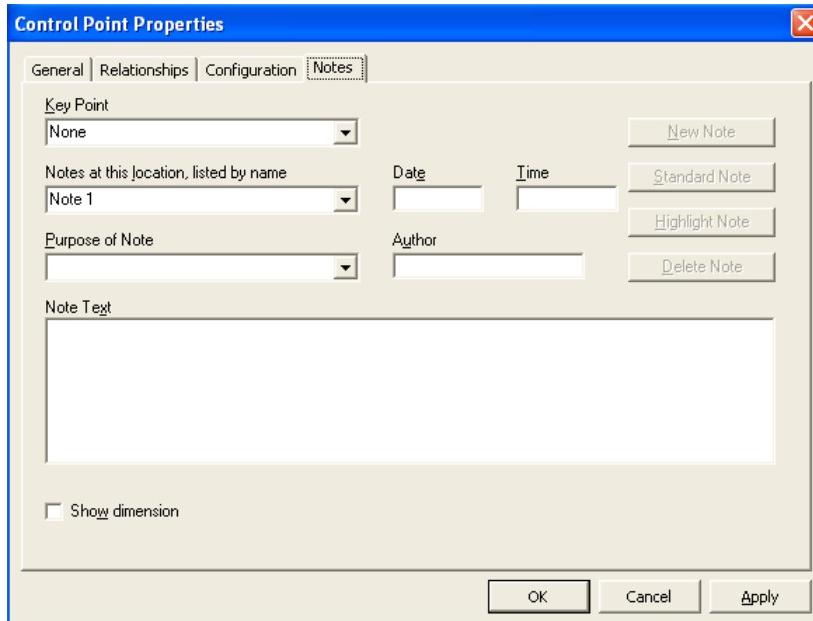
1. Select **Insert > Control Point**.
2. Select the pipe part in the model that needs a note.

TIP Use the quick pick tool to make the correct selection.



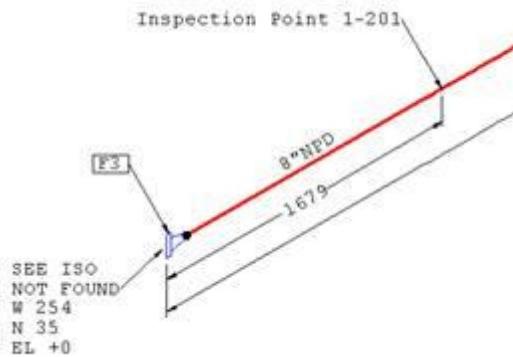
3. Position the control point on the centerline of the pipe part. For precision placement, use commands like **Measure**, **PinPoint**, or **Point Along**.
4. In the **Type** box, verify that **Control Point** is selected.
5. Confirm or change the option in the **Subtype** box on the ribbon.
6. In the **Name** box, define a name for the control point.

7. Click **Properties** .
8. Under the **Notes** tab, click **New Note**.
9. In the **Key point** box, select the control point to which to attach the note.
10. In the **Notes at this location, listed by name** box, type or select a name.
11. In the **Purpose of note** box, select **Fabrication** so that the note is picked up for inclusion in the drawing.
12. In the **Note text** box, type descriptive text for the note.
13. Check the **Show dimension** box if you want a dimension to appear on the drawing.



14. Click **OK**.
15. In the Drawings and Reports task, use the **Update Now** or **Batch > Update** commands to update the drawing that includes the pipe part with the associated control point.

The note appears where it was placed in the model.



Update

In marine mode or material handling mode, **Update** performs two functions:

- For existing drawings, this command updates a single document or multiple drawing documents.
- When drawings have not been created, this command generates and updates the drawings for the selected component. This option is only available for drawings-by-rule components.

NOTE Marine mode or material handling mode only: If you did not previously select the model contents for a drawings-by-rule component, the **Filter Properties for Asking Filter** dialog box displays, and you must select a filter. The dialog is the same as the **Filter Properties** dialog box, except that only the appropriate tabs for the asking filter are displayed. For more information, see **Filter Properties Dialog Box**.

For other plant mode drawings, this command updates a single document or multiple drawing documents.

Update is available when you right-click on:

- A folder or component in the **Management Console**. All drawings in all components within the folder are updated.
- A component in the **Management Console**. All drawings in the component are updated.
- One or more documents in the **Detail View**. The selected drawings are updated.

This command works on your local computer regardless of the batch configuration.

Update performs a smart update of a drawing. If a set of criteria is met, then an incremental update is performed only for the geometry of added, modified, and deleted objects. If the criteria are not met, then a full update of all geometry is performed.

All of the following criteria must be met for **Update** to trigger an incremental update:

- Each view in the drawing has had at least one full update previously performed.
- The only view properties that have changed are name and description. For more information, see **View Tab (Drawing View Properties Dialog Box)**.
- The numbers of added, modified, or deleted objects in each view are less than a set percentage of the total number of objects.
- The software allows incremental updates for the view types in the drawing.

Any one of the following criteria cause **Update** to trigger a full update:

- A drawing view is new and has never had a full update.
- A drawing view is a section or detail view.
- A drawing view has been cropped.
- The view style, scale, orientation, or coordinate system of a drawing view have changed.
- A primary plate object in a view has been split or unsplit.
- The numbers of added, modified, or deleted objects in each view are greater than a set percentage of the total number of objects.
- The software does not allow incremental updates for the view types in the drawing.

The **Update** command is not available until you create drawings in the **Management Console** using the **Create Drawing(s)** command. When a folder or component is selected, all views in the component(s) are updated, including unassigned views in the **Unassigned Folder** of the Drawing View Explorer.

NOTES

- If you have not previously selected a filter for the component, the **Select Filter** dialog box displays, and you must select a filter. For more information, see [Select Filter Dialog Box](#).
 - An incremental update is usually faster than a full update, but still results in completely up-to-date geometry for the view.
 - Documents created automatically in a Drawings by Rule component are automatically deleted by updating the component if the document no longer contains views.
 - The **Update** command is only available for drawings by rule. For other drawing types, the **Update Now** command is used. For more information, see [Update Now \(on page 177\)](#).
-

What do you want to do?

- [Update all drawings in a folder or a component \(on page 183\)](#)
 - [Update a single drawing \(on page 183\)](#)
 - Create automated major views for steel order scantling drawings
 - Create an assembly drawing
-

Update all drawings in a folder or a component

NOTE Before you update a folder or a component, you can refresh its documents to determine which documents are out-of-date. For more information, see *Refresh document status* (on page 177). You do not have to refresh before updating, but it can be helpful to determine which documents are out-of-date.

1. Right-click a drawings-by-rule folder or component in the hierarchy. The component must contain existing drawings or reports. The folder must contain a component with existing drawings or reports.
2. On the shortcut menu, click **Update**. The icons for the out-of-date documents change to show they are updated. If the Batch Server is configured, the command displays the **Schedule Wizard**.

Batch Schedule Wizard Common Tasks

NOTES

- Documents created automatically in a Drawings by Rule component are automatically deleted by updating the component if the document no longer contains views.
- You can update an individual document by right-clicking the document and selecting **Update** or **Batch > Update** on the shortcut menu.
- If you place drawing property labels on a template, generate a drawing, move the labels on the drawing, and then update the drawing, the software remembers the new position of the labels on the drawing.

Update a single drawing

1. Right-click a drawings-by-rule document.
2. On the shortcut menu, select **Batch > Update** to update the document on the batch server now or create a schedule to run the batch job. Select **Update** to update locally. The icon for the out-of-date document changes to show it is updated ✓.
3. If the batch server is configured, the **Schedule Wizard** displays.

Batch Schedule Wizard Common Tasks

NOTES

- When using the **Batch > Update** command and batch processing is configured for the selected document, the update is performed on the Batch Server. If batch processing is not configured, the command behaves the same as the **Update** command, performing a complete regeneration of the entire drawing on the local machine.
- If you place drawing property labels on a template, generate a drawing, move the labels on the drawing, and then update the drawing, the software remembers the new position of the labels on the drawing.

Conditional Drawing Update

Before updating a drawing, Smart 3D ensures necessary information is present before changing the existing drawing document. If any of the following conditions are true before the update process begins, the software displays an error message that lists the missing items, and makes no changes to the drawing. If any of the following conditions are true after the update process begins, the drawing update process stops, changes to an error status () , and Smart 3D preserves the previous state of the drawing document to avoid any data loss.

Reference Data Conditions

- View style cannot be found.
 - Graphic preparation rule cannot be found.
 - Graphic rule cannot be found.
 - Label rule cannot be found.
 - Dimension rule cannot be found.
 - North arrow rule cannot be found.
 - Matchline rule cannot be found.
 - View rule cannot be found.
- View style filter cannot be found.
- *Emptyvw.sha* file cannot be found.
- *Styles.sha* file cannot be found.

Model Data Conditions

- Associated volume cannot be found.
- Associated coordinate system cannot be found.

Memory Conditions

- Not enough available memory to begin the update process.
- Not enough available memory to complete the update process after it has started.

NOTES

- Failure conditions found before the update process can be viewed in the **Drawings.log**.
- Failure conditions found during the update process can be viewed when you right-click a drawing and select **View Log**.
- Failure conditions are not logged when the **Update** command is used on a drawing view. You must use the **Update Now** command in either the **Drawing Console** or Drawings and Reports task to save the error(s) to the log.
- If an orphan view (a view that exists in the model database without a corresponding view) exists, it is removed from the database and a description of the error is logged in the Drawings log file in <Temp Folder>\Logs.

Restore

Restores a drawing document from a model restored from a backup. This command is available when you right-click on a document in the **Drawing Console** or the **Drawings and Reports** task.

NOTES

- When a document is restored, all document properties are overwritten.
- You cannot restore a document if the document is created in your current model after the backup is created. If you select a group of documents to restore, new documents in the group are not restored. All other documents are restored from the backup model.
- Views that are created in your current drawing after the backup is created are lost when you select **Restore**.

What do you want to do?

- *Create a backup to use for restoration (on page 185)*
- *Restore a document from a backup model (on page 185)*

Create a backup to use for restoration

1. In the Project Management environment, create a backup file of your current model using **Tools > Backup**. For more information, see *Backup* in the *Project Management User's Guide*.
2. Create a new model in the site by restoring the backup file using **Tools > Restore**. For more information, see *Restore and Restore Wizard* in the *Project Management User's Guide*.

 **TIP** Give the new model a name that makes it easy to identify as the backup of your current model.

Restore a document from a backup model

1. In the **Drawing Console** or the **Drawings and Reports** task, right-click on a drawing document in your current model, and select **Restore**.
*The **Restore Document** dialog box displays.*
2. Select the backup model from the **Model** box, and then click **OK**.
The document in your current model is replaced with the document from the backup model.

Publishing 3D Data

You can publish 3D model data in the Drawings and Reports task or using the **Tools > Drawing Console** command. The model can then be viewed through SmartPlant Foundation or SmartPlant Review. For more information, refer to the Drawings and Reports Help.

See Also

Smart 3D in an Integrated Environment (on page 8)

3D Model Data

 You can create a 3D Model Data component and base it on a specific filter. The filter defines the contents of the component documents when they are created. You can use the 3D Model Data component to output SmartPlant Review files or CAD (SAT) files.

Output as Neutral CAD (SAT) Graphics File

You can setup the 3D Model Data component to output your model objects to a neutral CAD (.sat) file format. Right-click the 3D Model Data component, and select **Setup** to set the filter and output file path.

Output as SmartPlant Review File

You can setup the 3D Model Data component to output your model objects as SmartPlant Review files depending on how you set up the 3D Model Data component. The software creates .vue and .xml files by default. If you select the **Generate streaming vue output (.zvf file)** option on the **Setup** dialog box, the software creates all three SmartPlant Review files: .zvf, .vue, and .xml.

You can set the output on the 3D Model Data component to save the SmartPlant Review (SPR) file to disk only, database only or both.

- Select **Disk only (do not save to database)** to save the generated graphics and data files to the specified path. You can then update and publish the 3D Model Data files to SmartPlant Foundation in an integrated environment. This option helps prevent data congestion by allowing you to save and publish your files locally.
- Clear **Disk only (do not save to database)** and do not specify output paths to save the data only to the database.
- Clear **Disk only (do not save to database)** and specify the output paths to save the data to the database, and as files to the specified paths.

The basic workflow for creating a 3D Model Data component is as follows:

- Create a 3D Model Data component, and set it up with a filter and output file information.
- Create the 3D Model Data document (one document per 3D Model Data component).

 **NOTE** SmartPlant Review shows the objects from the .vue file using global coordinates. If you plan to save the 3D Model Data component documents to a .vue file using the **Save as SmartPlant Review File** command, right-click the component and select **Properties** to check the **Style tab Coordinate System** property setting. You want to make sure the **Plant Monument Coordinate Offset** is passed correctly to SPR when creating the .vue file. The

offset value allows you to see the original coordinates relative to the new SPR coordinate system.

- Revise the documents if publishing to SmartPlant Foundation.
- Set properties **Surface Styles and Aspects** properties as needed on the 3D Model Data documents.
- Update the documents using **Update Now** or **Batch > Update** on the 3D Model Data component shortcut menu.
- If SmartPlant Foundation requires a password, you are prompted to type it when updating 3D Model Data documents.
- Save the documents to a predefined location for viewing in SmartPlant Review or publish the documents to the registered SmartPlant Foundation plant.

Recommendations for Exporting to SmartPlant Review

- The number of objects generated by a 3D Model Data component and exported successfully to a SmartPlant Review file depends largely on the type of objects and your hardware resources. We recommend that you limit each 3D Model Data component filter.
- Monitor the error logs regularly for resource issues, even if the specified filter worked initially. You can add more objects to the model meeting the filter criteria.
- SmartPlant Review (SPR) version 6.1.0.15 (or higher) allows you to open multiple .vue files simultaneously. Refer to your SmartPlant Review documentation for more information. When you open .vue and .xml files in SPR for the first time, SPR builds a database containing the tag information for the files. This process can take a significant amount of time.
- SmartPlant Review (SPR) version 6.2.0.29 (or higher) supports turning SmartPlant aspects on and off. All aspects are turned on by default in SPR. The *SPRSchema.txt* file can be customized to add any customized aspects.

NOTE The **3D View Control** used for viewing the published graphics in SmartPlant Markup Plus does not currently support turning aspects on and off.

Project Supervisor Setup

Your project supervisor should set up appropriate filters that define the objects to include in the component documents when they are created.

You must install the **SmartPlant Schema Component** and the **SmartPlant Client** to use this component.

3D Model Data Component Common Tasks

The following tasks are used to set up a 3D Model Data component and configure it for viewing in SmartPlant Review or publishing.

Define Your Workspace

The defined workspace does not need to include objects being manipulated for SmartPlant Review.

Setup a 3D Model Data Component

You can create and set up a 3D Model Data component to create SmartPlant Review output files or neutral CAD (SAT) graphics files.

Create the 3D Model Data Document

To create the 3D Model Data document, right-click the component and select the **Create Drawing** command. When this command is complete, the document is listed in the **Detail View**.

Set Surface Style Rules and Aspects for 3D Model Data Documents

Before you update your 3D Model Data documents, set the surface style rules and aspects to use for the model objects. You can specify the properties for the 3D Model Data component and documents by right-clicking and selecting **Properties**.

Update 3D Model Data Documents

Update your 3D Model Data documents using **Update Now** or **Batch > Update** on the component or document shortcut menu.

Save Data as a SmartPlant Review File

You can output your 3D Model Data to a SmartPlant Review (.vue) file whether you are working in a stand-alone or integrated environment.

Set Revision Information

The document revision process is separate from the publishing process, making it possible to revise a document locally and save it to the database without re-publishing the document.

Publish Data

If your model has been registered using the SmartPlant Registration Wizard, you can publish your 3D Model data for retrieval in other tools.

Setup (3D Model Data Component)

Sets options for a 3D Model Data component. This command is available on the shortcut menu on a 3D Model Data component.

Setup Dialog Box (3D Model Data Component) (on page 189)

With this command, you specify a filter that identifies the objects you want collected by the 3D Model Data component. You have several combination options for output of the objects:

- SmartPlant Review graphics file (VUE)
- CAD output file (SAT)

The CAD export function supports the following:

- Color information and transparency values - The software can retrieve color information and transparency values from the styles and apply them to the SAT file. If no style is selected, the default 3D object style is applied. If there is no style associated with an object, green is applied by default.

You do not need to define the workspace or verify that the workspace contains all of the objects required by the 3D Model by Query filter subset.

NOTES

- You can publish .zvf files and launch SmartPlant Review to view the .zvf files. You can also use **File > View and Markup** to use SmartPlant Markup Plus to navigate the model. You do not have to use the **Save as SmartPlant Review** command to use the SmartPlant Review features.
- After you create a component, you must update the documents to extract the data from the database to create the .vue, .zvf, and .xml files.

Setup Dialog Box (3D Model Data Component)

Sets options for the 3D Model Data component. You access this dialog box when you right-click a 3D Model Data component and select **Setup** on the shortcut menu.

Filter

Identifies the filter to use to define the objects to include in the component definition. The filter needs to be specific to the objects that you want to publish or to save to a SmartPlant Review file.

TIP You do not need to define the workspace to contain all of the objects required by the 3D Model Data filter subset.

Options

Specifies how the 3D Model Data is saved. The setup for your 3D Model Data component is different depending on whether or not you are registered to work in an integrated environment.

Generate SmartPlant Review output (.vue file)

Indicates that you want the 3D Model Data saved as a SmartPlant Review .vue file.

Generate streaming vue output (.zvf file)

Indicates that you want the 3D Model Data saved as a .zvf file in addition to a .vue file. Check this option if you intend to attach this data as a reference to another plant. The .zvf

format allows you to attach this plant data as a reference to another plant using Reference 3D functionality.

Generate CAD output (.sat file)

Indicates that you want the 3D Model Data saved as an SAT graphics file.

Disk only (do not save to database)

Specifies how the graphics and/or data files are saved:

- Select **Disk only (do not save to database)** to save the files only to the specified path. You can then update and publish the .vue or .zvf file to SmartPlant Foundation from the designated locations.
- Clear the **Disk only (do not save to database)** and do not specify output paths for the data to only be saved to the database.
- Clear the **Disk only (do not save to database)** and specify the output paths to save the data to the database and as files to the specified paths.

You can change this option at any time during your work so that you can determine the best save and publish options for your specific environment.

Path to save graphics file

Specifies the file to which the graphics for the 3D Model Data will be saved. Click the ellipsis button to browse for the correct file.

Path to save data file

Specifies the file to which the data will be saved. Click the ellipsis button to browse for the correct file. This box is automatically populated, and the ellipsis button does not display when you specify a .vue file. For example, if you specify C:\temp\tpjtest.vue in the **Path to save graphics file** box, then the **Path to save data file** box automatically displays C:\temp\tpjtest.xml.

NOTES

- You can publish .zvf files and launch SmartPlant Review to view the .zvf files from within SmartPlant Foundation. You do not have to use the **Save as SmartPlant Review** command to use the SmartPlant Review features. For more information on publishing, see *Publish* (on page 196).
- For more information about the SmartPlant Registration Wizard, see *Working in an Integrated Environment* in the *Intergraph Smart™ 3D Installation Guide*, available from **Help > Printable Guides**.

See Also

Setup (3D Model Data Component) (on page 189)

Setup a 3D Model Data component (on page 191)

3D Model Data Component Common Tasks (on page 188)

Setup a 3D Model Data component

The 3D Model Data component is used with the **Save as SmartPlant Review** and **Publish** commands. It is also used to output model graphics to neutral CAD (.sat) files. Before creating a 3D Model Data component, you should create filters that specify the objects required for your output.

1. Right-click a folder in the **Console**.

TIP To add a folder, right-click the root or another folder.

2. On the shortcut menu, select **New**.

The **Add Component** dialog box displays.

3. Select the **3D Model Data** component, and click **OK**.
4. Right-click the new 3D Model Data component and then select **Setup**.
5. Specify a filter to identify the model data to include when the data is saved or published. Select **More** to display the **Select Filter** dialog box. Click **Properties**  to display the current filter properties.
6. If you need to output the 3D Model Data to SmartPlant Review, select **Generate SmartPlant Review output (.vue file)**. If you need to output the data as a neutral CAD format graphics file (.sat file), select the **Generate CAD output (.sat file)** option.
7. Select or clear the **Disk only (do not save to database)** option to specify how to save the 3D Model Data. If you are registered in an integrated environment, checking this option allows you to update and publish the output files to SmartPlant Foundation.

NOTE When saving as SmartPlant Review files, the behavior of the 3D Model Data setup is different depending on whether you are registered to work in an integrated environment or not. For more information on how this option affects the saved data, see *Setup Dialog Box (3D Model Data Component)* (on page 189). For more information on registering your model using the SmartPlant Registration Wizard, see the section titled *Working in an Integrated Environment* in the *Intergraph Smart™ 3D Installation Guide*, available from the **Help > Printable Guides** command.

8. Specify file paths for the data file and the graphics file as needed.
9. Click **OK** to save the component settings and create the output files as specified.

NOTES

- After you create a component, you must update the documents to extract the data from the database and create the .vue, .zvf, and .xml files. For more information on tasks associated with the 3D Model Data component, see *3D Model Data Component Common Tasks* (on page 188).
- If you are setting up the 3D Model Data component with the intention of saving it as a SmartPlant Review (SPR) file, right-click the component and select **Properties** and go to the **Style** tab to make sure the **Coordinate System** property is set appropriately so that the **Plant Monument Coordinate Offset** is passed correctly to SPR when creating the VUE file. This is because SPR shows the objects from the VUE file using global coordinates. The offset value allows you to see the original coordinates relative to the new SPR coordinate system. For more information on 3D Model Data components, see *3D Model Data* (on page 186). For information on saving to SPR, see Save as SmartPlant Review File.

- If you are setting up the 3D Model Data component for output to the CAD format graphics file, you can export color and transparency style rules along with the objects to the SAT file when it is created. To set the style for export, right-click the 3D Model Data component and select **Properties**. Go to the **Surface Styles and Aspects** tab, select the style and click **Add**. This property tab includes the style rules that are created in the **Common** task. You can also create new styles by clicking **New**. After the style is set, right-click the 3D Model Data component and select **Update Now** to create the SAT file with the specified style.
- Because the AutoCAD software can open only SAT files of version 5, the ACIS version in the SAT file is written as 5 by default. If you want to output the current ACIS version, contact *Intergraph Support* (<http://www.intergraph.com/support>) or your local office.
- For the SAT output, all the bodies are merged and then saved to the SAT file. If you are using viewers, such as MicroStation, that cannot open merged bodies, contact *Intergraph Support* (<http://www.intergraph.com/support>) or your local office.

See Also

- Publishing Documents* (on page 193)
Setup (3D Model Data Component) (on page 189)
Find Documents to Publish (on page 210)
Publish (on page 196)

SECTION 6

Publishing Documents

When you work in an integrated environment with SmartPlant Enterprise, you must publish documents containing the drawing data and relationships before other authoring tools can share this information. You can publish your documents from the Drawings and Reports task **Management Console** or from a 3D modeling task by using the **Tools > Drawings Console** command.

Before you can publish documents in the software, you must install the SmartPlant Client and the SmartPlant Schema Component, then register the model using the SmartPlant Registration Wizard.

In a 3D task, you can use **SmartPlant > Retrieve** to create and update the Design Basis objects.

The software allows you to publish modified and new objects with the **Changes Only** option. Publish tasks processed through the **Changes Only** workflow are smaller compared to **All** publishes, and are queued to **Load** and **Consolidate** before the merge operation. The merge operation combines the delta data with the previous complete publish data. After the merge operation succeeds, the information is retrievable. The **Changes Only** publishes are not retrievable. To retrieve a **Changes Only** publish, you must perform an **All** publish, which only happens after the load and consolidate processes.

The **Publish** and **Update and Publish** commands are available for the following document types:

- 3D Model Data (SmartPlant Review file type)

NOTE The 3D Model Data component is capable of publishing many object types (for example: Piping, Equipment, Cable Trays) depending on the definition of the filter during component setup.

- Orthographic Drawings (viewable file with links to data)
- Isogen Isometric Drawings (viewable file with links to data)

NOTE The software supports publishing additional files (for example: PCF, POD) along with the SHA drawing. For more information, see *Enterprise Data* in the *Isometric Drawing Options Reference Guide*. You can access this document using the **Help > Printable Guides** command in the software.

- Reports (viewable file with links to data)

NOTES

- The viewable files created when you publish drawings and reports provide relationship links to the 3D Model Data. You must also publish the 3D Model Data to provide the navigation between the viewable files and the 3D Model Data.
- The **Publish > Update and Publish** command updates and then immediately publishes the selected documents in one step. This command is available only if the model is registered with SmartPlant Foundation.
- For a list of common tasks related to publishing, see *Publish Common Tasks* (on page 196).

- If you are publishing 3D Model Data documents, set the surface style rules and aspects before publishing the documents.
- Every time you generate drawings and reports from Smart 3D in an integrated environment, a SmartPlant Foundation token is used.

When you publish documents, the software:

- Publishes a visual representation of the document that you can view without Smart 3D. For drawings, this is an Intergraph proprietary file, called a RAD file (.sha). For reports, the viewable file is a Microsoft Excel workbook. You can review and mark up the visual representation of the document using SmartPlant Markup Plus or SmartSketch.
- Places the published XML file and any viewable files in the appropriate SmartPlant Foundation vault. This XML file can be retrieved when you are in other authoring tools.

Reasons to Publish

You publish documents and associated data for several reasons:

- Exchanging of data with other tools
- Sharing common data between tools
- Providing enterprise-wide accessibility to published documents
- Managing change, including workflow history, document revisions, and title block information

Revisions and Versions of Published Documents

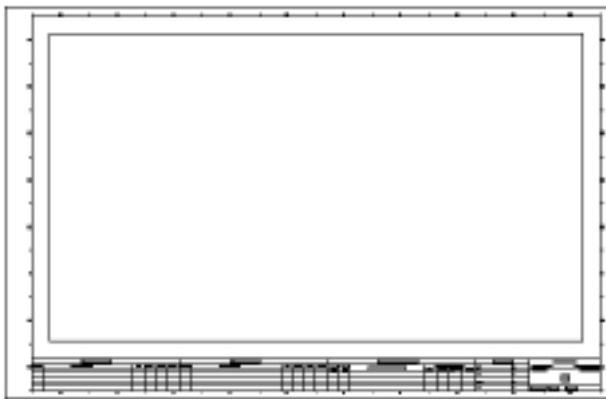
The first time that you publish a document, the software creates a new document master and the first revision. A revision (major) is an officially recognized change to a document. A version (minor) is an intermediate update that you have published. Revisions can be published for sharing or they can go through an approval process, depending on your needs. Each revisions of a document can have multiple versions.

You can also include revision information within the title block of a drawing by placing drawing property labels within the drawing template.

NOTE When you publish data from any authoring tool, you may not be able to view all of the properties that you published in the SmartPlant Client. You can customize view definitions to allow you to see additional properties. For more information on defining view definitions in the SmartPlant schema, see the *SmartPlant Schema Editor User's Guide*. For further assistance with viewing data, contact Intergraph Support Services. You can find support information on our web site, <http://support.intergraph.com> (<http://support.intergraph.com>).

Publishing Title Blocks

The title block is generally displayed at the bottom of a drawing template. It can include signatures, revision and issue information, and other properties associated with the drawing.



You add drawing properties, such as revision information or issue requests, to the title block using the **Place Drawing Property Label** command when editing a template.

When you update the revision information or receive an issue request on a drawing document, the associated properties must be updated. You update the drawing document to incorporate the property changes for any drawing property labels included in the title block.

After you update the drawing document, you can re-publish it and the appropriate title block information is recorded in SmartPlant Foundation. Publishing your drawing document helps you manage the changes, including workflow history, document revisions, and title block information.

The general workflow for including information in the drawing title block is:

1. Edit a template and include drawing property labels for revision or issue request - Place a Drawing Property Label on a Template.
2. Create drawing documents using the template.
3. Publish the drawings - *Publish documents* (on page 201).
4. Revise the drawing document or receive an issue request from SmartPlant Foundation - *Revise a document* (on page 174) or *Issue request documents* (on page 205).
5. Update the drawing documents to include the new revision, issue, or other drawing property information in the title block.

See Also

Publishing Documents (on page 193)
Updating Documents (on page 176)

Publish Common Tasks

The following tasks are used to publish documents. If the documents are drawings or reports, the **Publish** command publishes a viewable file with links to the data. If publishing a 3D Model Data document, the software creates a SmartPlant Review file and publishes it.

NOTE The viewable files created when you publish drawings and reports provide relationship links to the 3D Model Data. You must also publish the 3D Model Data to provide the navigation between the viewable files and the 3D Model Data.

Setting Properties for Publishing

- Before using the Publish command, you should set certain properties on your documents.

If you are publishing 3D Model Data documents, set the surface style rules and aspects as needed before publishing.

Creating and Reserving Revision Numbers

You should create your documents by right-clicking them and selecting **Create Document(s)**. After they are created, if you require revision numbers for the documents, use the **Revise** command to reserve the revision numbers.

Update the Documents

Update the documents, right-click the component and select the appropriate **Update** command. You can also use **Batch > Update** if you are configured to use a batch server.

Publish Data

If you have registered your model using the SmartPlant Registration Wizard, you can publish your documents for retrieval and use in other tools. You can use the **Publish > Update and Publish** command to update drawings and publish them in one step. You can also use the **SmartPlant > Find Documents to Publish** command to generate a list of documents that need to be published and to publish terminations for deleted drawings, isos, and so on.

See Also

3D Model Data Component Common Tasks (on page 188)

Publish

Publishes the information in the selected documents. You can access the **Publish Documents** command by right-clicking a component or document.

The **Publish** and **Update and Publish** commands are available for the following types of documents:

- 3D Model Data (SmartPlant Review file type)
- Orthographic Drawings, including Volume and Composed drawings (viewable file with links to data)
- Isogen Isometric Drawings (viewable file with links to data)

- Reports (viewable Microsoft Excel workbook file with links to data)

NOTES

- The viewable files created when you publish drawings and reports provide relationship links to the 3D Model Data. You must also publish the 3D Model Data to provide the navigation between the viewable files and the 3D Model Data.
- The **Publish > Update and Publish** command updates and then immediately publishes the selected documents in one step. This command is available only if the model is registered with SmartPlant Foundation.

 **IMPORTANT** When you publish a 3D model, you must now enable the **Scheduler** and **Loader** in SmartPlant Foundation to make the 3D model data document retrievable. The load, consolidate, and merge tasks must complete successfully before the 3D model document can be retrieved.

Define the **Discipline** and **Document Type** properties to enable publishing for the documents. For more information see *Set properties for publishing documents* (on page 197).

 **NOTE** For 3D model data, the **Discipline** and **Document Type** properties are already populated.

You may also want to specify documents to be revised, not published, or reserve revision numbers. For more information, see *Revising* (on page 173).

To generate a list of documents that need to be published, you can use **SmartPlant > Find Documents to Publish**. For more information, see *Find Documents to Publish* (on page 210).

You can publish isometric drawings to SmartPlant Foundation in additional file formats other than the **SHA** drawing file format. These additional files along with the **SHA** drawing are generated by the update process. When publishing isometric drawings you can also publish other available data files and reports generated by the update process. For more information, see *Published Files (S3D Supplementary)*.

Publish Dialog Box (on page 206)

What do you want to do?

- *Set properties for publishing documents* (on page 197)
- *Publish documents* (on page 201)
- *Publish a large 3D model to SmartPlant Foundation* (on page 204)
- *Issue request documents* (on page 205)

Set properties for publishing documents

1. In the **Console**, right-click an item in the hierarchy, then select **Properties** on the shortcut menu.
2. Go to the **WBS Tab**.
3. Set the **Document Type** property as needed, such as Civil Plan. This property specifies the document subtype when published.

4. Set the **Document Style** property as needed, such as Ortho for an orthographic drawing.
5. Set the **Discipline** property. If your model has been registered using the SmartPlant Registration Wizard, this property adds the **Publish** command to the right-click menu for the selected document or documents. For a 3D Model Data document, the property is set to **SmartPlant Review Document**. For a drawing or report document, set the discipline to match the type of document.
6. Set the **Allow Publish** property to **Yes**.

NOTES

- If you do not want an item to acquire a property from its parent, select the **Override** column on the **Properties** dialog box, then type a new value. This value propagates to other items deeper in the hierarchy.
- The software treats blank or cleared property values as overrides.
- Before you can publish documents, you must:
 - Install the SmartPlant Client and the SmartPlant Schema Component.
 - Register your model using the SmartPlant Registration Wizard.
 - Revise and update each document.

For more information about configuration, see the *Intergraph Smart™ 3D Installation Guide*, available from **Help > Printable Guides**.

Support for Handling Large Publishes

The number of objects published from Smart 3D can become so large that the normal update and publish processing uses up the resources such as memory and address space on the client and server computers. To address these resource issues, Smart 3D now supports the concept of using a cache to keep track of objects that have changed and to only publish these objects. Thus, the software avoids processing objects that have not changed. The mechanisms for doing this are called parallel update, delta publish, and auto-scoping. These processes are not visible to the user.

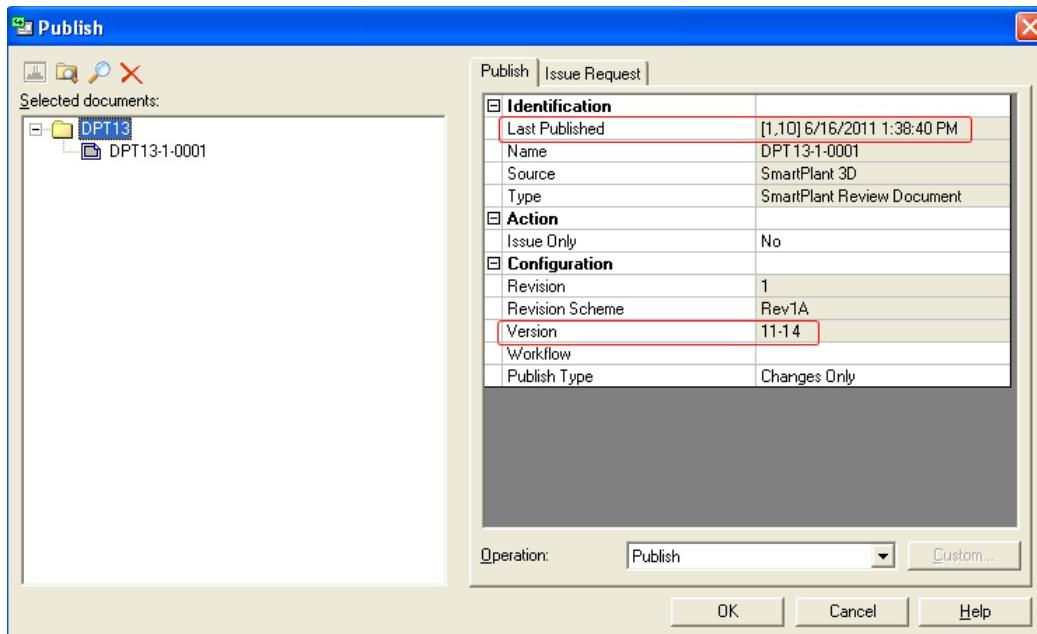
- **Parallel update** - Updates all the objects. The update process determines the number of processors on the system and uses this information to partition the objects so that multiple updates can happen at the same time. Because the updates are happening in parallel, the system can update a larger number of objects faster.
- **Delta publish** - Leverages the cached information provided by parallel update to determine which objects must be published. Because only changes are published, you can produce larger files in the data warehouse.

Because the complete set of objects will not be published each time, it is up to Smart 3D to keep track of deleted and moved objects. These moved or deleted objects will be sent with the published objects, eliminating the need to probe the adapter for the existence of missing objects.

★IMPORTANT When you publish a 3D model, you must now enable the **Scheduler** and **Loader** in SmartPlant Foundation to make the 3D model data document retrievable. The load, consolidate, and merge tasks must complete successfully before the 3D model document can be retrieved.

Both parallel update and delta publish can publish larger documents by automatically splitting the data into smaller sections in Smart 3D. If your publish data is split into smaller sections, the document version number increments for each section.

For example, if you publish a document that is split into four smaller sections, the **Version** field contains all resulting version numbers. In the following dialog box, the published documents are published to SmartPlant Foundation as 4 different versions (11-14). The last version contains all of the updated information from the publish.



Published Documents - Load, Consolidated, and MergeDelta Tasks (S3D)

A tool published document results in a document version object in SmartPlant Foundation. A document version has four files attached to it.

1. **Data XML file** – Contains published objects, relationships and correlations (SameAs relationships).
2. **Meta data XML file** – Contains meta data about the published document version.
3. **Instructions XML file** – Contains instructions for deleted objects and relationships. Also contains resurrect instructions for objects that were deleted previously and resurrected as a result of restoring a tool database.
4. **View file** – This is a file in the tool format that represents the (graphical) view of the published document.

When a document is submitted to a workflow that has a load process step, the following tasks are created.

NOTE If the document is not published to such a workflow, and when the **Load document** command in SmartPlant Foundation Desktop Client is run on the published document, the same tasks are created.

- **Load Task** - This task processes the objects and relationships in the data XML by loading them into a publish domain. This task also processes the instructions in an Instructions XML

file. For example, the delete instruction would result in termination of the object referenced in the delete instruction.

- **Consolidate Task** - This task processes the correlations (SameAs relationships) in the data XML file. A SameAs is a correlation relationship published by tools indicating that a published object is identical to an object published by another tool. The correlation of the object in the current publish domain (say, local object) to the external object (object published by another tool in another publish domain) is done by creating a shared object in the Data Warehouse domain. The local and external objects are linked through SPFCComprisedOf relationships; for example, one SPFCComprisedOf relationship between the local object and the shared object, and a second SPFCComprisedOf relationship between the external object and the shared object.

 **NOTE** An object that is not correlated also has a shared object created in the Data Warehouse domain in preparation for future correlation.

The consolidate task also creates a hidden file, known as graphical mapping file, which has mappings between objects in the database and graphical elements in the view file. This file is used by SmartPlant Foundation Desktop Client for navigation between published objects in the list view and their graphical representations in the view file.

- **MergeDelta Task** - This is a task created for delta publishes of Smart 3D. A delta publish contains new, modified and deleted objects in a document since the last publish of that document. Only Smart 3D has the capability to do a delta publish. Other tools publish full data where every object is published whether it is modified or not since last publish.

Because a delta published data XML file and view file only contains the delta, it is required that it becomes a full data XML and full view file for complete view of the data and graphics of that document. The MergeDelta task converts the delta data XML file into a full XML file by merging data from the previous full XML file into the delta XML file.

 **IMPORTANT** When you publish a 3D model, you must enable the Scheduler and Loader to make the 3D model data document retrievable. The load, consolidate, and merge tasks must complete successfully before the 3D model document can be retrieved. For more information, see *Scheduler and Queue Management* in the *Scheduler and Queue Management Guide*. Schedulers and Queue Management. *Scheduler and Queue Management* in the *Scheduler and Queue Management Guide*.

 **NOTE** If you are using **SmartPlant Basic Integrator**, only the merge task must complete successfully before the 3D model document can be retrieved. For more information, see "Scheduler and Queue Management" in the *Scheduler and Queue Management Guide*. Schedulers and Queue Management.

The merge involves the following:

- a. Replace modified objects and relationships in the full publish XML, view file, and the hidden graphic map file.
- b. Delete objects and relationships that are identified in the delete, and move instructions in the delta instructions XML file, view file, and the hidden graphic map file.
- c. Add new objects and relationships to the full publish XML, view file, hidden graphic map file.
- d. Replaces the delta XML file in the vault with the updated full publish XML file, view file, and the hidden graphic map file.

Set SmartPlant Foundation to Tolerate Failed Loads

For working in any integrated environment, a new site configuration flag in SmartPlant Foundation Server Manager allows the SmartPlant Foundation Loader to skip a published document that failed during load and continue processing other documents in the queue.

In SmartPlant Foundation Server Manager, set the **SkipFailedDocumentsInLoad** flag to **True** to allow failed documents to be skipped and other documents to continue processing. Typical behavior is that after a document is successfully loaded, any previous failed document is removed from the queue.

The behavior during a Smart 3D publish is different. If any Smart 3D publish, either a full publish or delta publish, fails to load, the failed versions remain in the load queue until a full publish successfully loads. If a delta publish loads successfully following these failures, it does not remove any previous failed version from the queue because the data in delta publishes is different from version to version, so a failed previous version needs to stay in the queue until you resolve the failure or a full publish is loaded. A second reason is this gives an indication to you that a full publish is needed. When a full publish is loaded, all failed delta publishes are removed from the queue.

Publish documents

Before you can publish documents, you must ensure that your computer is configured properly. The configuration includes installing the SmartPlant Client and the SmartPlant Schema Component and registering the model through the SmartPlant Registration Wizard. For more information, see the *Intergraph Smart™ 3D Installation Guide* available from **Help > Printable Guides**.

You must use the **SmartPlant > Retrieve** command in one of the 3D tasks to import published data.

★ IMPORTANT When you publish a 3D model, you must now enable the **Scheduler** and **Loader** in SmartPlant Foundation to make the 3D model data document retrievable. The load, consolidate, and merge tasks must complete successfully before the 3D model document can be retrieved.

■ NOTE The **SmartPlant** menu is not available in all tasks.

1. Right-click a component and select **Publish**. The **Publish** dialog box displays.

■ NOTES

- If the **Publish** command is not available on the shortcut menu for the component or document, check the document properties and make sure that the documents are up-to-date and have been revised first. For more information, see *Set properties for publishing documents* (on page 197).
- You can use the **Publish > Update and Publish** command to update drawings and publish them in one step. This command is available only if the model is registered with SmartPlant Foundation.

2. Edit information as necessary for the selected documents.

When multiple documents are selected, only property values shared by all of the selected documents display in the table. Changing a value in the table changes that value for all of the selected documents.

3. Select the **Publish Type**.

- Smart 3D supports **Publish Type** for delta publish.

NOTES

- The default setting for **Publish Type** is **Changes Only**. If the 3D model has not been published before, the software automatically selects **All** and performs a complete publish to ensure all filtered data is published and loaded into SmartPlant Foundation.
- For subsequent publishes, select **All** to publish all filtered data in the 3D model, even if it is unchanged. Select **Changes Only** to publish only the changes in the 3D model since the last successful publish.
- If the 3D model does not publish successfully during a delta publish, select **All** so that data from the previous publish is published and loaded into SmartPlant Foundation.
- Other SmartPlant applications do not support **Publish Type**. For these SmartPlant applications, the default setting for **Publish Type** is **All**, and it cannot be changed.

4. Select one of the following operations:

- **Publish** to publish the selected documents immediately.
- **Background publish** to publish as a separate process so that you can continue working in the application.
- **Scheduled publish** to publish in the batch mode by the authoring tool. The documents are not published immediately. Instead, the selected documents are scheduled for publish at a later time and may be scheduled as a recurring operation.

5. Click **OK** to publish the selected documents. For more information, see *Publishing Documents* (on page 193).

NOTES

- You can verify the publishing process by starting the SmartPlant Client on your computer and searching for the published document.
- When publish is complete, the following message displays: **Documents have been published successfully**. If the **View Log** button is enabled, messages are available concerning the operation. These messages include errors, warning, and informational messages. Click **View Log** to review these messages.

See Also

- Find Documents to Publish* (on page 210)
- Publish* (on page 196)
- Publishing Title Blocks* (on page 195)
- Find Documents to Publish Dialog Box* (on page 211)
- Publish Dialog Box* (on page 206)
- Publish Tab (Publish Dialog Box)* (on page 206)

Publish Workflows

When a SmartPlant application publishes, the user can publish documents using a workflow. The following list describes the delivered publish workflows and use cases for the workflows.

Workflow	Workflow Description	Workflow Use Cases
Auto-Correlate	<p>Compares the objects in a published document to the objects that are already in SmartPlant Foundation. If the object correlates (by name) to an object with the same shared object definition, SmartPlant Foundation automatically correlates the objects. If the object can correlate to more than one object through multiple shared object definitions, a task is placed in the To Do list to allow the user to select the correlation.</p>	<p>Use Auto-correlate</p> <ul style="list-style-type: none"> ▪ When a publishing tool does not have correlation functionality. ▪ When a publishing tool does not retrieve. ▪ When using SmartPlant Foundation to perform consistency checking and the authoring applications do not retrieve. ▪ When Shared Objects To Correlate option is used to configure which types of objects are auto-correlated.
AutoLoadPublish	<p>Generates a document load task and consolidate task for the publishing document. These tasks are performed by the SmartPlant Foundation Scheduler.</p>	<p>Use AutoLoadPublish when you intend to load the published document data into SmartPlant Foundation.</p>
AutoLoadPublish Merge	<p>Publish large 3D models. Creates the published 3D document, loads the 3D data in SmartPlant Foundation, then merges these object sets into a new composite document that represents the entire 3D model.</p>	<p>Use AutoLoadPublishMerge when you intend to view or navigate multiple 3D models as one composite 3D model document in one 3D view.</p>
Correlate	<p>Places published objects with possible correlations in the To Do list. From the To Do list, the user manually correlates selected items. SmartPlant Foundation creates a shared object.</p>	<p>Correlate works similar to Auto-Correlate except you can view the possible correlations before the actual correlation takes place.</p>
Publish	<p>Takes the document through an approval step. Upon approval, it creates the document load and consolidate tasks.</p>	<p>Use Publish when you want the published document approved before it is loaded into SmartPlant Foundation. The approval step is added to the To Do list.</p>
PublishWithDocLoad	<p>Loads document into a document configuration and submits document to approval step. Upon approval, it creates document the load and consolidate tasks.</p>	<p>Use PublishWithDocLoad when you want to view the document data in SmartPlant Foundation before approval. The approval step is added to the To Do list.</p>

Workflow	Workflow Description	Workflow Use Cases
PublishForLoadOnly	Generates a document load task and consolidate task for the publishing document and makes the documents irretrievable by any tool. These tasks are performed by the SmartPlant Foundation Scheduler.	Use PublishForLoadOnly when you want to publish documents to view, navigate and also for consistency checking in SmartPlant Foundation without the possibility of the document being retrieved by any tool.

Publish a large 3D model to SmartPlant Foundation

Publishing large 3D models to SmartPlant Foundation has reached memory and file transfer limitations. To make publishing 3D models more efficient, you can publish models in distinct object sets that accommodate your memory resources. Distinct object sets mean that an object in the 3D model must appear in only one published model. You publish these object sets using a workflow called **AutoLoadPublishWithMerge**. This workflow has **MergePublishedFile** process step configured. This workflow creates the published 3D document, loads the 3D data in SmartPlant Foundation, then merges these object sets into a new composite document that represents the entire 3D model. The name of the composite document is same as the name of the workflow to which the Published 3D model is submitted. If you have existing published 3D models in SmartPlant Foundation and want to merge these into one representative model document, you can create a 3D composite document manually, and then relate the published models to the document.

1. Create filters for segregating and selecting data that will be in the published model documents. For example, you can create filters for equipment, piping, structural, and HVAC.
2. In the **Drawings and Reports** task, create your separate model documents.
3. Publish each model document separately.

NOTE The software publishes a new version of the 3D document, for example, a model document called Equipment-1-001, to SmartPlant Foundation. This document is related to **AutoLoadPublishWithMerge**, a zvf file, and a mapping file.

4. On the **Publish** tab on the **Publish** dialog box, select the **AutoLoadPublishWithMerge** from the **Workflow** list.

Issue request documents

Before you can publish documents, you must ensure that your computer is configured properly. The configuration includes installing the SmartPlant Client and the SmartPlant Schema Component and registering the model with the SmartPlant Registration Wizard. For more information, see the *Intergraph SmartTM 3D Installation Guide* available from **Help > Printable Guides**. For more information on the steps involving the SmartPlant Foundation Desktop Client, see the *SmartPlant Foundation Desktop Client User's Guide*.

NOTE This functionality is only available in project mode. It is not supported in integration mode.

You must use the **SmartPlant > Retrieve** command in the Common task to import published data.

1. Right-click a component and select **Publish**. The **Publish** dialog box displays.

NOTE If the **Publish** command is not available on the shortcut menu for the component or document, check the document properties and make sure that the documents are up-to-date. For more information, see *Set properties for publishing documents* (on page 197).

2. Click the **Issue Request** tab.
3. In the **Issue to** field, select the contract that you want to assign the document or documents.
4. Under **Selected documents**, select the documents that you want to associate with the specified contract.
5. Click **Add** to add the documents to the **Issue Request** list. To remove documents from the list, select them and click **Remove**. Click **Engineering Tools** to add documents from engineering tools, such as P&IDs or PFDs. Click **File System** to add documents from another file system, such as Microsoft Word documents or Microsoft Excel workbooks.
6. Click **OK** to issue the contract request for the selected documents.
7. Start SmartPlant Foundation Desktop Client on your computer and search for the published document to verify the publishing process.
8. Right-click the document in the Desktop Client tree view and select **Refresh**.
9. Return to the Drawings and Reports task and update the document to incorporate the new Issue information. For more information, see *Updating Documents* (on page 176).
10. Review the Issue properties. Right-click the document and select **Properties**. Select the **Issue** tab to see the Issue information. You can also open the document to see the Issue information in the title block if you added it.
11. Publish the document with the updated Issue information. For more information, see *Publishing Documents* (on page 193).

NOTES

- Only updated documents can be published.
- You can verify the publishing process by starting the SmartPlant Client on your computer and searching for the published document.

See Also

Find Documents to Publish (on page 210)
Publish (on page 196)

Publish documents (on page 201)
Publishing Title Blocks (on page 195)

Publish Dialog Box

Provides a list of documents selected to publish.

Publish Tab (Publish Dialog Box) (on page 206)
Issue Request Tab (Publish Dialog Box) (on page 209)

See Also

Publish documents (on page 201)
Find Documents to Publish (on page 210)
Publish (on page 196)

Publish Tab (Publish Dialog Box)

Displays the properties of the selected document or documents. If only one document is selected in the tree view, the properties displayed on this tab are the properties of that one document. If multiple documents are selected, only the properties with the same value for all documents display. Any properties with varying values across the documents display with blank values in these fields.

You can change some of the values assigned to one or more documents by changing the value displayed in the table. The value you type here overrides any existing values for all selected documents.

Selected documents

Displays a list of the documents selected for publishing. You must populate this list by selecting documents in the **Management Console** or **Detail View** before you use the **Publish** command. For each document, this list displays the name, the type of document, the workflow from which the document was last published, the revision and version numbers, the revision scheme, and the date when the document was last published.

Engineering Tool

Opens a dialog box to select documents to add to the **Selected documents** list. This functionality is not available in the current release.

File System

Opens a standard Microsoft dialog box that allows you to select documents to add to the **Selected documents** list. When you select a file with this **Select File** dialog box, the **Document Properties** dialog box displays, allowing you to specify information about the file, such as whether it is a new file; the category, type, and subtype of the document; and the name, description, and title of the document.

Find

Opens the **Find Documents to Publish** dialog box, which allows you to search for documents to add to the **Selected documents** list. For more information, see *Find Documents to Publish Dialog Box* (on page 211).

Last Published

Indicates the date on which the document or documents were last published.

Name

Displays the name of the document.

Source

Indicates the authoring tool in which the document was created.

Type

Displays the type of document or documents selected.

Comment

Allows you to type information about the selected documents that are publishable.

Issue Only

Allows you to issue request documents without, necessarily, republishing them. Use this option when no changes were made to a drawing and you only want to add it to a contract.

💡 TIPS

- Even with this option set, you can still publish the documents. If any of the documents have never been published, they must be published, regardless of this setting.
- You will receive an error message if you select multiple documents and activate this option when one or more of the selected documents cannot be changed. For example, the error message displays if the selected set of documents includes both a new document (for which this field can be set only to No) and current or locked documents (for which this field can be set only to Yes). The error message prompts you to select a smaller set of documents.

Owning Group

Select an owning group from the drop down list to which the document belongs.

📝 NOTES

- By default, the owning group selected for the previous version, if any, is shown.
- All the owning groups configured in SmartPlant Foundation are listed.

Revision

Displays the current revision number of the selected document or documents.

💡 TIP You will receive an error message if you attempt to change the value in this field when you have selected one or more documents that have conflicting revision schemes or different possible revisions. The error message prompts you to select a smaller set of documents.

Revision Scheme

Displays the revision scheme applied to the selected document or documents.

📝 NOTE Only revision schemes that are applicable to the configuration (plant) or classification (document type) are available in the shortcut menu. The revision schemes related to a configuration or classification are not available for any other configurations or classifications. If none of the revision schemes are related to the configuration or classification, then all revision schemes are available unless they are related to any other configuration or classification. For more information on revision scheme configuration, see *Configuring Different Revision Scheme Strategies* in the *How to Configure Document Management* guide.

💡 TIP You will receive an error message indicating that this field cannot be edited if one or

more of the documents that you have selected are not new or will have a revision scheme supplied by the authoring tool. The error message prompts you to select a smaller set of documents.

Version

Indicates the current version of the document or documents.

Workflow

Indicates the workflow to which the selected document or documents are assigned.

Publish Type

Allows you to publish all data in a 3D model or only the changes to the model since the last successful publish. If the 3D model has not been published before, the software automatically selects **All** and performs a complete publish to ensure all filtered data is published and loaded into SmartPlant Foundation.

Publishing documents	Publish Type	
	All	Changes Only
First publish after creating the document	All objects	All objects
Subsequent publish with no changes to the model	All objects	No objects
Subsequent publish with changes to the model	All objects	Changed objects
Subsequent publish with no changes to the model (after changing the Publish Type)	All objects	No objects
Subsequent publish with changes to the model (after changing the Publish Type)	All objects	Changed objects

TIP You will receive an error message indicating that this field cannot be edited if one or more of the documents that you have selected have conflicting sets of possible workflows. The error message prompts you to select a smaller set of documents.

Check and publish released claims for previously deleted items

Specifies that you want to resolve issues where deleted items were restored from an earlier version and the claim on them was released. This check takes additional time and should only be used when deleted items have been restored. This option is not supported in this release.

TIP This check box should also be activated when publishing after a backup is restored or when releasing the claim on an object forces another tool to release the claim on a related object that was previously deleted. In this specific case, the tool fetches the object from As-Built again and releases the claim.

Operation

Specifies the operation to perform on the selected documents.

- **Publish** - Selected documents are published immediately.
- **Background publish** - Selected documents are published immediately as a separate process, allowing you to perform other tasks at the same time.

- **Scheduled publish** - Selected documents are published in the batch mode by the authoring tool. This option is available only for tools that support batch mode and are processed by the authoring tool, not the SmartPlant Client. The documents are not published immediately. Instead, the selected documents are scheduled for publish at a later time and may be scheduled as a recurring operation.

 **NOTE** If the software cannot make a SmartPlant Foundation server connection when you use **Scheduled Publish**, you are prompted to provide a valid SmartPlant Foundation login and password.

Custom

Opens the **Custom** dialog box. This functionality is available only if defined by your project implementation team.

Check for deleted objects no longer on documents

Select **Check for deleted objects no longer on documents** option if you want to process the move instructions while publishing.

See Also

Publish documents (on page 201)
Find Documents to Publish (on page 210)
Publish (on page 196)

Issue Request Tab (Publish Dialog Box)

Displays the documents associated with a specific issue request and allows you to add documents to or remove documents from a request.

Selected documents

Displays a list of the documents selected for publishing. You must populate this list by selecting documents in the **Management Console** or **Detail View** before you use the **Publish** command. For each document, this list displays the name, the type of document, the workflow from which the document was last published, the revision and version numbers, the revision scheme, and the date when the document was last published.

Engineering Tool

Opens a dialog box to select documents to add to the **Selected documents** list. This option is not supported in this release.

File System

Opens a standard Microsoft dialog box that allows you to select documents to add to the **Selected documents** list. When you select a file with this **Select File** dialog box, the **Document Properties** dialog box displays, allowing you to specify information about the file, such as whether it is a new file; the category, type, and subtype of the document; and the name, description, and title of the document.

Find

Opens the **Find Documents to Publish** dialog box, which allows you to search for documents to add to the **Selected documents** list.

Issue to

Contains a list of all objects (contracts) that can support issue requests. When you select an item from this list, the names of any documents associated with that object display in the

table.

Add

Creates a new item in the table for any documents highlighted in the **Selected documents** tree view.

Remove

Deletes a selected document from the table.

Document Name

Displays the names of all documents associated with the object in the **Issue to** field.

See Also

Publish documents (on page 201)

Find Documents to Publish (on page 210)

Publish (on page 196)

Find Documents to Publish

Generates a list of documents that either have not been published or have been modified and need to be published again or have been deleted since the last publish. The command is found on the **SmartPlant** menu in the Drawings and Reports task.

TIP This command can also be accessed from using the **Find** button on the **Publish** tab of the **Publish** dialog box. For more information, see *Publish Tab (Publish Dialog Box)* (on page 206).

Documents must be up-to-date, and the required **Discipline** property must be defined in order for the documents to be available for publishing. An error message displays if one or more of the documents found by the **Find Documents to Publish** command do not meet this criterion. All items matching the publish criteria continue through the process. For more information on setting the appropriate properties, see *Set properties for publishing documents* (on page 197). For more information on updating documents, see *Updating Documents* (on page 176).

The **SmartPlant > Find Documents to Publish** command looks for the following:

- Documents created but never published
- Documents modified since their last publish
- Documents deleted after being published

The command looks for documents that need to be republished in the active WBS project. For example, if **Project A** is the active project, the **Find Documents to Publish** command looks for documents in **Project A** only. You set the active WBS project in the **Active Project** box on the main toolbar. For more information, see *Manage Projects* (on page 212).

Find Documents to Publish Dialog Box (on page 211)

Find documents to publish

Documents must be up-to-date, and the required **Discipline** property must be defined in order for the documents to be available for publishing. An error message displays if one or more of the documents found by the **Find Documents to Publish** command do not meet this criterion. For more information on setting the appropriate properties, see *Set properties for publishing documents* (on page 197). For more information on updating documents, see *Updating Documents* (on page 176).

1. From the Drawings and Reports task, click **SmartPlant > Find Documents to Publish**.

† TIPS

- This command is available only if you have registered the model using the SmartPlant Registration Wizard.
- This feature is also available by clicking the **Find** button on the **Publish** dialog box.
- The **Find Documents to Publish** command determines which documents need to be published or re-published and displays the results of the search in the **Find Documents to Publish** dialog box.

2. From the **Select documents to publish** list, check the boxes corresponding to the documents that you want to publish.

† TIP You can quickly select the entire list by clicking **Select All**, or you can clear the entire list by clicking **Clear All**.

3. Click **OK** to accept the selections. The documents selected for publishing now display in the **Documents to Publish** list on the **Publish** dialog box and can be saved by publishing the documents. For more information, see *Publish documents* (on page 201).

Find Documents to Publish Dialog Box

Allows you to search for documents that have been updated since they were last published. Additionally, you can use this dialog box to terminate documents that were previously published but no longer exist in the authoring tool. You can access the **Find Documents to Publish** dialog in two ways:

- Select **SmartPlant > Find Documents to Publish**.
- Click **Find** on the **Publish** command dialog box.

Last Published

Displays the date when the files were last searched. The information displaying in the lists on this dialog box was found on this specified date and time. This option is not available in the current release.

Update

Displays the Update dialog box, which allows you to define new search criteria for finding documents to publish. This option is not available in the current release.

Select documents to publish

Displays a list of files that were either updated since they were last published or files that have not yet been published. For each file, this list displays the file name and type, and the date on which the document was last published. If the file has not been published, the **Last Published** field for the document is **New**.

Select documents to terminate

Displays a list of the files that were previously published but have since been removed from the project. For each file, this list box displays the file name and type, and the date on which the document was last published.

Select All

Selects all of the files in the associated list of documents.

Clear All

Clears any selected documents in the associated list.

See Also

Publishing Documents (on page 193)

Find Documents to Publish (on page 210)

Publish Tab (Publish Dialog Box) (on page 206)

Manage Projects

The Work Breakdown Structure (WBS) project is shown in the dropdown at the upper left-hand corner of the Drawings and Reports task window, next to the **Permission Group** dropdown. It shows the current active project.



In the Common task, you can create new WBS items and projects or edit existing ones. For more information, see the *Common User's Guide*.

You use projects in conjunction with publishing. The active project must be set before using the **Final Publish** command on the **SmartPlant** menu. Project mode is not supported in Integration, so **Final Publish** is not available.

See Also

Publishing Documents (on page 193)

Select Active Project Dialog Box (on page 212)

Select Active Project Dialog Box

Specifies the active project. You can access the **Select Active Project** dialog box by clicking **More** in the **Active Project** box on the main toolbar. You define whether you want to look in the local **Workspace** or in the **Database** for the project by selecting the options at the top of the dialog box. The project hierarchy updates with the selection of the option.

See Also

Manage Projects (on page 212)

Using SPRDirect

The workflow in using SPRDirect consists of the procedures outlined below. The remaining sections describe each process in more detail.

NOTE If you are upgrading from a previous version of Smart 3D, you need to run the Bulkload Reference Data application.

1. Copy configuration files and corresponding folders to your current symbol share folder from their installed location. See *Copy Report Types, Labels, and the Configuration File* (on page 213).
2. Bulkload the SPRDirect catalog additions (upgrade only).
See *Bulkload the SPRDirect Catalog (Upgrade Only)* (on page 214).
3. (Optional) Edit the ReportSettings.txt configuration file to add any new labels, surface style rules, and aspects.
See *Edit the ReportSettings.txt Configuration File* (on page 215).
4. Create and run the SPRDirect Report.
See *Create an SPRDirect Report* (on page 217).

NOTE You can generate SmartPlant Review files using 3D model data and SPRDirect. However, you can only publish these files to SmartPlant Foundation using 3D model data within Smart 3D. You cannot publish SPRDirect directly in an integrated environment. SPRDirect files must go through SmartPlant Interop Publisher to publish them to SmartPlant Foundation.

Copy Report Types, Labels, and the Configuration File

If your Smart 3D project uses a custom symbol share, you need to copy the files, folders, and sub-folders listed below into that custom location so that they may be used to create MDB2 and VUE file as outputs directly from S3D.

SmartPlant Review Report Type

Default install location: `[ProductFolder]\3DRefData\SharedContent\Reports\Types of Reports\Smartplant Review`. Copy the entire Smartplant Review folder to your custom symbol location under `\Reports\Types of Reports`.

SmartPlant Review Labels

Default install location: `[ProductFolder]\3DRefData\SharedContent\Labels\Types of Labels\Smartplant Review`. Copy the entire Smartplant Review label folder to your custom symbol location under `\Labels\Types of Labels`.

Also copy the MapClassIdToLevelDisciplines configuration file installed in the `[ProductFolder]\3DRefData\SharedContent\Xml` folder to the `\Xml` folder in your custom symbol location.

Bulkload the SPRDirect Catalog (Upgrade Only)

Perform a bulkload operation to load the SmartPlant Review report and SmartPlant Review labels into the symbol SharedContent folder.

★IMPORTANT This operation is not required for Smart 3D version 2011 R1 or later.

1. Before you begin, go to the release notes for your upgrade and note the location of the Reports worksheet.
2. Click **Start > Programs > Intergraph Smart 3D > Database Tools > Bulkload Reference Data**.
3. In the **Excel files** box, click **Add** and load the Report workbook along with any other workbooks included in the upgrade. The default location for reference data upgrade workbooks is *[Product Folder]\CatalogData\BulkLoad\AdditionalDataFiles*.
4. Under **Bulkload mode**, click **Add, modify, or delete records in existing catalog**.
5. Under **Catalog information**, select either **MSSQL** or **ORACLE** in the **Database Type** box.
 - If you selected **MSSQL**, select the name of a server in the **Database server name** box. This location is where the Catalog database and schema are stored (or will be stored, if you are creating a new database set).
 - If you selected **ORACLE**, select the name of the Oracle net service for the Catalog database connection in the **Oracle Service** box. The service must exist before you choose it in this box.
6. In the **Database name** box, select the name of the Catalog database that you want to update with new reference data.
7. Select the Catalog Schema database name in the **Schema database name** box.
8. In the **Log file** box, click the browse button  to specify the name and location of the log file.
9. Click **Load**. You can see messages in the status bar of the Bulkload utility while it is running.
10. Open the log file to check for any errors or warnings in the bulkloading process. You can quickly scan the **Error Analysis** section at the end of the log file to check for errors.
11. Click **Close**.

NOTE For more detailed information about loading reference data, see the Smart 3D Reference Data Guide.

Edit the ReportSettings.txt Configuration File

The ReportSettings.txt configuration file provides the Smart 3D class name-to-label name mapping.

NOTE Before you begin, make sure you copy the ReportSettings.txt file and its corresponding folder from its installed location to your symbol share location. See *Copy Report Types, Labels, and the Configuration File* (on page 213).

Edit the ReportSettings.txt file when:

- You add new, customized labels and surface style rules.
- You add aspects to objects in the Smart 3D project file.

If you do not add this information to the ReportSettings.txt file, the new labels, surface style rules, and aspects are not available in SmartPlant Review.

Add New Labels

Labels can contain out-of-the-box (standard) attributes or properties as well as new, custom attributes. You can create a new label or modify an existing label and change its name. For workflow and descriptions on creating labels and label rules or using the Label Editor, refer to those sections in the *Drawings and Reports Reference Data Guide*.

As an example, the steps below show you how to add a new label called **SPR Control Point Data** so that control point objects are displayed in SmartPlant® Review. The Smart 3D class name for control points is CPControlPoint.

NOTE You can use the MetadataBrowser utility to look at the catalog schema data to see the Smart 3D classes. For more information, see *Using the Schema Browser* in the *Catalog User's guide*.

1. Create the new label in the **Drawings and Reports** task and add the control points to the label.
2. Use any ASCII text editor to open the ReportSettings.txt file.
3. Add the new label using the format: [class name]: [label name]. Add the line **CPControlPoint : SPR Control Point Data** as shown in the figure below.

```

CArea : SPR Space Data
CZone : SPR Space Data
CPIInterferenceVolume : SPR Space Data
CPControlPoint : SPR Control Point Data
!
! Surface style rules are applied in the order they appear in the file.

```

For each new label, add a new line in the text file.

4. Save your edits and close the file.

NOTE If you do not add the new label names to ReportSettings.txt, then the labels are not displayed in SmartPlant Review.

Add New Surface Style Rules

Surface style rules define the appearance of objects in your workspace. For example, you can create and apply a specific surface style rule for objects to appear consistently in certain colors,

and textures. Follow the steps below to add a new surface style rule, and then add it to ReportSettings.txt.

Create the Surface Style Rule

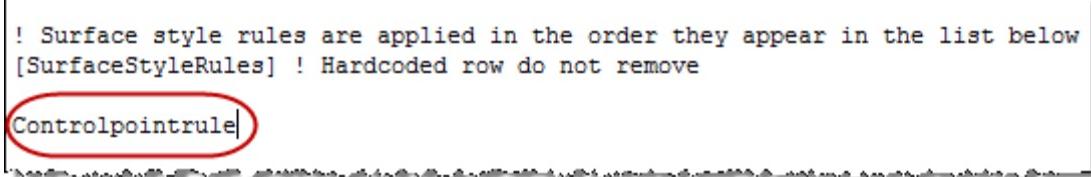
1. Click **Format > Surface Style Rules**.
2. Click **New**.
3. Type a name for the new surface style rule in the **Rule name** box.
4. Select a filter in the **Filter** list, or click **More** to create a new filter if necessary.
5. Create a New Filter
6. Choose a style to apply in the **Style applied** list.
7. Select all the aspects that you want the filter to apply to by clicking in the **Select all aspects to which the style will be applied** list.

NOTES

- You can add new surface styles to apply through rules on the **Format > Style** dialog box.
- After creating a new surface style rule, you can apply it to the workspace by selecting a rule in the **Style rule library** box and clicking **Add** to add the rule to the **Workspace** box.

Because the software processes the rules in descending order, you should list the most specific rules at the top of the list. Click Move Up and Move Down to change the order of the rules in the Workspace list. Add the New Rule to ReportSettings.txt

1. Use any ASCII text editor to open the ReportSettings.txt file.
2. Type in the new surface style rules in the Surface style rules section. The name is not case sensitive. Surface style rules are applied in the order they appear in the list. In the example below, the surface style rule named **Controlpointrule** is added.



```
! Surface style rules are applied in the order they appear in the list below
[SurfaceStyleRules] ! Hardcoded row do not remove
Controlpointrule|
```

3. For each new surface style rule, add a new line in the text file.
4. Save your edits and close the file.

Adding Aspects

The aspect represents information about the object, such as its physical shape or the space required around the object. Aspects basically define how objects look in a 3D model view. Smart 3D provides a variety of standard aspects that can be selected. For a list of aspects, see *Format View* in the *Common User's Guide*. You must type in the aspects you want to use in the ReportSettings.txt file.

1. Use any ASCII text editor to open the ReportSettings.txt file.

2. In the **Aspects** section of the ReportSettings.txt file, type in the aspects you want to use for the graphic object display. The example below shows the addition of the **Reference Geometry** aspect.

```
! Graphics belonging to all aspects listed below will be output to the vue file
[Aspects] ! Hardcoded row do not remove

Simple Physical
Insulation
Reference Geometry
```

NOTE Simple Physical is the default aspect that is used if no other aspects have been set. Even if you remove Simple Physical from the ReportSettings.txt file, Smart 3D still uses it.

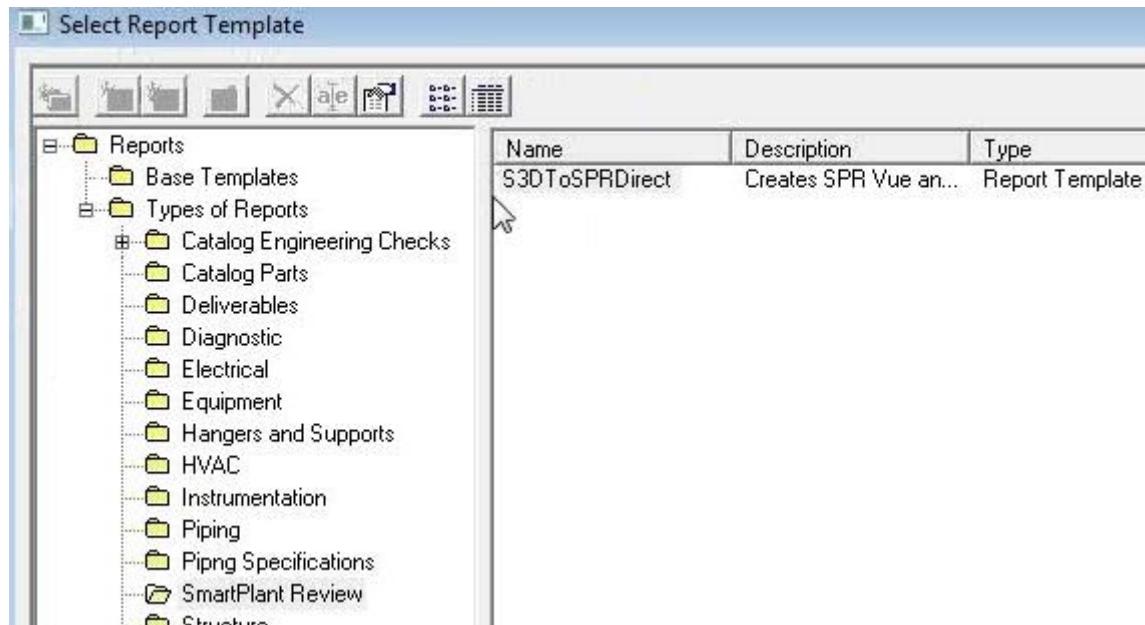
3. For each aspect, add a new line in the text file.
4. Save your edits and close the file.

Create an SPRDirect Report

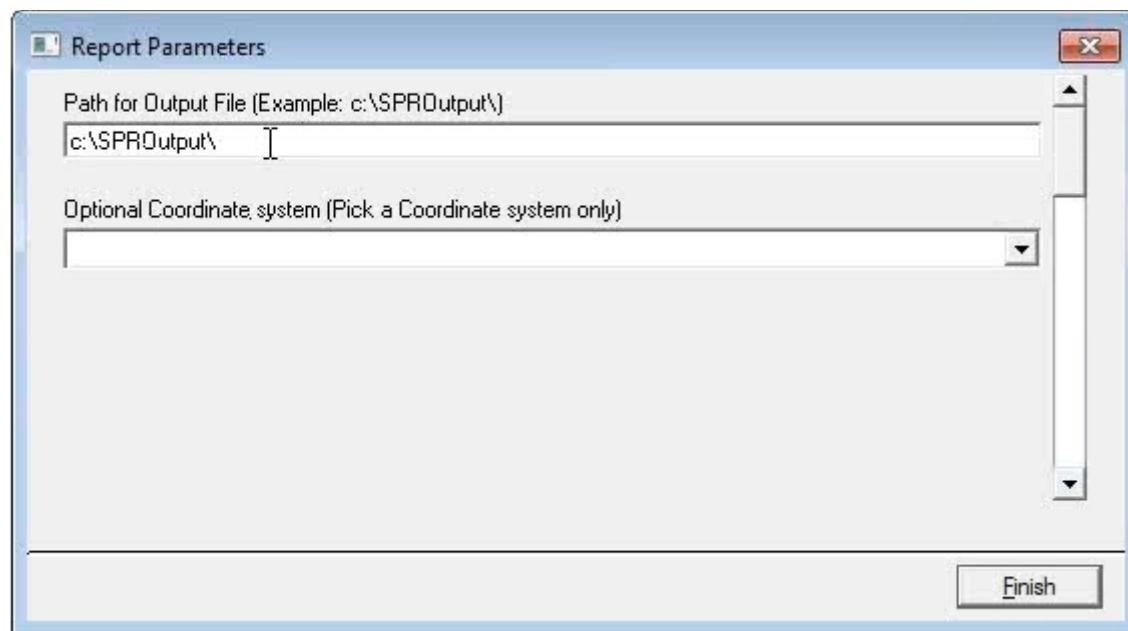
Follow the steps below to create your document and use the SmartPlant® Review spreadsheet template to create and then update or generate VUE and MDB2 files.

1. Click **Task > Drawings and Reports**.
2. Right-click the top-level model item or a sub-level item in the Console hierarchy.
3. On the shortcut menu, select **New**.
4. Select **Folder** in the **General** tab and click **OK**.
The folder is added to the hierarchy.
5. Right-click on the folder, and click **Rename** on the shortcut menu.
TIP You can also press **F2** on the keyboard.
6. Right-click again on the new folder, and click **New**.
7. Click **Spreadsheet Reports** in the **General** tab and click **OK**.
8. Right-click on the spreadsheet report and click **Rename**. Type in the new name.
9. Right-click on your spreadsheet report and click **Create Report**.

10. Click the **SmartPlant Review** folder from the **Types of Reports** node in the **Reports** list, and then click the **S3DToSPRDirect** template.



11. Click **OK** to exit the **Select Report Template** dialog box, and then select the filter you want to use for the report.
12. Type in the path name where you want to place the VUE and MDB2 files. You do not have to define a coordinate system.



13. Click **Finish**.
14. Repeat steps 10-13 for each report you want to create. For example, you can create a report for different areas in your model.

15. Right-click on your spreadsheet report and click **Update Now**.

Smart 3D generates the VUE and MDB2 files, and places them in the designated output folder.

You can now open the resulting VUE files in SmartPlant Review. See the *SmartPlant Review User's Guide* for more information on opening a VUE file.

Report Parameters Dialog Box (SPRDIRECT)

Defines the location for the VUE and MDB2 files when using SPRDIRECT.

Options

Path for Output File

Type in the path name where you want to generate the VUE and MDB2 files. You do not have to type the file names.

Optional Coordinate system

Select a coordinate system from the menu list to use. This value is optional.

See Also

Create an SPRDIRECT Report (on page 217)

SECTION 7

Troubleshooting Integration

This section contains troubleshooting tips for integration.

Registering Your Model with another SmartPlant Foundation Plant

If you want to register your model with a different SmartPlant Foundation plant, you can run the Remove **Design Basis custom** command, which removes all correlation relationships and deletes all design basis objects in the 3D model.

Then, you can register the model. You must retrieve all of the data again, and re-correlate objects.

★IMPORTANT You must run the **Remove Design Basis** command from a task in the model, not from **Project Management**.

1. Start the software.
2. Click **Tools > Custom Commands**.
3. Click **Add** on the dialog box.
4. In the **Command ProgID** box, type **IMSEngFrameworkCmd.RemoveDsgnBasis**.
5. In the **Command name** box, type text such as **Remove Design Basis**.
6. Click **OK** on the **Add Custom Command** dialog box.
7. Select the command name, and click **Run**.
8. Click **Yes** on the message boxes.

NOTES

- After running this command, register the model, retrieve information, and re-correlate objects.
- For more information about other custom commands, see the *Common User's Guide*, available from **Help > Printable Guides** in the software.

Retrieving and Viewing Piping from SmartPlant P&ID

To ensure that piping properties are passed correctly from SmartPlant P&ID to Smart 3D, you must specify the value **SmartPlant 3D** for the **Use Piping Specification** property in SmartPlant P&ID Options Manager.

Verifying P&ID Integrity

If there is a problem displaying a P&ID or selecting objects on a P&ID, you can run a custom command to troubleshoot the connections between the objects on the P&ID and the objects in the Model database. The ProgID for this command is **SP3DDisplayPIDService.VerifyPIDCmd**, and it provides the following statistics for a selected P&ID:

- Design Basis Objects: The total number of design basis objects that have a relationship to the P&ID document object. The number should be the same as what is seen in the P&ID Viewer.
- 3D Objects: The number of design basis objects that have a correlated relationship between the P&ID document and the Smart 3D object. The current correlation status is also reported.
- P&ID Objects (Total Identified): This count is the total number of RAD objects that have a drawing ID in the P&ID document. The total identified should match the number of Design Basis Objects. These objects are displayed with their representation ID.
- P&ID Objects (contained in Design Basis): The number of RAD objects that have a graphic OID that will map to drawing representation design basis objects. This number should match the Design Basis Object count. A mismatch most likely means that the objects were deleted. The difference is the number of Deleted P&ID OIDs.
- Deleted P&ID OIDs: The number of RAD objects that have a graphic OID but do not exist in the model.
- Duplicate OIDs: The number of multiple RAD objects with the same graphic OID. Most likely, there is a problem with the P&ID file or with the integrated environment.
- Miscellaneous Errors: Any errors not defined above are in this category.

Accessing Map Files

When running the **Compare Design Basis** command, the software looks for the map file on the SharedContent share. If you do not have access to this share or to the map file, you will see an error message. Ask your administrator to grant you access privileges to the SharedContent share.

Mapping Enumerated Lists

To use an enumerated list (also called codelist or select list) in an integrated environment that includes Smart 3D, you must map the list in the SmartPlant schema. If the list does not already exist in the SmartPlant schema, then it has to be created there and mapped. If it already exists in the SmartPlant schema, then you must define the mapping between the SmartPlant schema and the tool map schema.

Enumerated lists in Smart 3D are not mapped in the Schema Editor. These lists use the index number defined in the enumerated definition to map from the tool to the SmartPlant schema.

For example, if you want to add Fluid System values, modify the SmartPlant schema to include the fluid codes that are missing. You can examine the catalog data in the **Catalog** task or in the Excel .xls files that were bulk loaded to find out which fluid codes to add and their numbers. You must also generate component schemas to create a new P3DComponent.xml file, which is part of the SmartPlant schema.

For publishing operations, you will need to make the corresponding changes and additions in the publish map.

★IMPORTANT User reference data codes start at 10,000. Values less than 10,000 are reserved for use by Intergraph.

Here are some important points to check when troubleshooting the mapping of enumerated lists for publishing:

- Did you extend the enumerated list in the SmartPlant schema?

- Did you extend the Smart 3D publish map?
- Have you used the same value in both the SmartPlant schema and the Smart 3D publish map?
- Have you regenerated component schemas?

Have you regenerated the views on the Model database? You can use the View Generator at [Product Folder]\Core\Tools\Administrator\Bin for this purpose. The schema to use is the Catalog Schema database.

Glossary

abstract part

A part that is only defined by a partial specification and that cannot be materially provided by the organization that defines the specification.

Active Template Library (ATL)

Set of class templates and wizards supplied with Microsoft C++ Version 5.0 and later. You can use an ATL when you create ActiveX controls and any other type of object that uses the Component Object Model (COM) model. Using an ATL is generally preferred over Microsoft Foundation Classes (MFC), because the implementations are smaller, easier to use, and more closely tied to the COM model.

angle

The circular measurement taken from the intersection of two pipes at a turn or branch.

approval state

Recorded state of acceptance of information contained in objects within the database. The approval states indicate a level of confidence in the information stored in the database and govern your ability to alter specific data about a product.

arrangement (accommodation)

Those components of a system arranged in three-dimensional space with accurate dimensional representation for installation. Various types include electrical, HVAC, machinery, outfitting, and piping.

attribute

A single type of non-graphics information that is stored about an object such as diameter or end preparation.

axis

An imaginary line used to define the orientation of a system or object normally defined in terms of an x-, y-, and z-axis. Some 3-D graphic objects have an associated axis used to define the center or axis for rotations.

basic design

Engineering definition of the model and its systems.

bill of material (BOM)

Hierarchical decomposition of a product into constituent assemblies and parts. Specific types of BOMs exist (for example, an EBOM is a bill of material from the point of view of an engineering department; an MBOM is a bill of material from the point of view of manufacturing).

bulkload

The process by which reference data in Microsoft Excel workbooks is loaded into the Catalog database.

catalog

Repository of information about components and materials used in construction. When you use catalog parts in the model, the software places an occurrence of the catalog part in the project. This occurrence is a copy of the actual catalog part.

Catalog database

The database that contains the reference data. Each model database can reference a different Catalog database.

chain

A set of continuous and tangent segments.

change history

Process of recording information such as who, when, and why for any given modification.

change management

Software features or manual procedures for managing the consequence of change. For example, software can support a change management feature to report drawings that need updating as a result of a change in a 3-D model.

change propagation

Ability of the software to intelligently modify dependent design information to reflect change in a higher order object.

class

Grouping of individual objects that share some very significant, common characteristics.

classification folder

A folder in the Catalog hierarchy that contains part classes. Classification folders are one level above part classes. The ClassNodeType and R-ClassNodeDescribes sheets in the Microsoft Excel workbooks define the classification folders.

codelist

A set of acceptable values for a particular property that can be referred to by an index number or selected in a combo box. For example, the codelist for the material specification allows you to select from a set of standard entries, such as ASTM A183-F316 Stainless Steel.

commodity code

A user-defined code that provides an index to parts in a catalog.

commodity item

A standard component found in a manufacturer catalog (an off-the-shelf component).

component

Physical part that a feature generates.

concurrent access

Ability of the software to allow multiple users to simultaneously access and modify the design of a model.

consolidated tasks

A collection of tasks run in batch. For example, the software allows you to extract a set of drawings immediately or to schedule the batch extraction for a future time.

constraints

A logical restriction that controls how part symbols ports relate to each other and to reference ports. There are four constraints: parallel, perpendicular, coincident, and distance.

contract

A Work Breakdown Structure object representing a scope of work, usually performed by an external supplier. The contract is related to a project and appears in the Work Breakdown Structure hierarchy.

coordinate

The location of a point along the X-, Y-, or Z-axis.

coordinate system

A geometric relation used to denote the location of points in the model. The most common coordinate system is the rectangular coordinate system, whereby points are located by traversing the X-, Y-, and Z-axes of the model. Normally, coordinate systems have their origin defined as 0,0,0.

cutting plane

A plane that cuts through an object.

damage records

Data relating to the damage and repair of structure or components that occurred during or after construction of a plant.

data interchange

Capability to output the design, or portions of the design, in a standard format for use or movement to another computer software system.

database

Repository for the product model data. The database contains information to describe individual objects in the data model and the relationships between objects as appropriate.

database backup

Process of recording a backup copy of the complete database or the incremental changes after the date that the last complete copy was created.

database break and recovery

Utilities used to restore a database after files are corrupted.

database copy

Functionality to copy large collections of model objects from one design project to another design project.

database management

Functionality related to managing a product model database.

database monitor record

Transactions that occur in order to provide database (DB) recovery after a stop in response with a minimum of lost data.

degree

The highest polynomial factor in the curve or surface mathematical definition. A line is a degree 1 curve, while a cubic B-spline is a degree 3 curve.

design alternative

Difference in a design represented by a separate version. A design alternative can be a new design prepared as a proposed change, or one of several elective options that the builder or customer selects. Each design alternative has an identification assigned so you can uniquely refer to the design alternatives.

design approval log

Record of review and approval of parts of the design.

design data auto input

Automation in loading existing design data into a new design database.

design documents

Drawings, sketches, material lists, procedures, and so forth that are generated during the design phase.

design object

Any object with properties that you can select. A design object can be related to one or more contracts of different types, but related only to one contract of a given type.

design progress check

Analysis of the content of the design to some metric unit that gives an idea of the degree of completion.

design review

Functionality to support rapid viewing of the design and markup of features with comments.

design service

Any general system services related to the design function.

design standard

Feature or object used in plant design that has been determined to the normal or approved way of accomplishing a design requirement. In the context of computer software, the term refers to computer functionality to support standards, not the standard itself.

detail schedule

Lowest level of schedule used to manage and track work progress.

distributed systems

Systems consisting of sequential parts with a distributive characteristic (for example, pipes distribute fluids, HVAC distributes air, cabling distributes power, and structure distributes loads).

distribution systems

Term synonymous and used interchangeably with the term distributed systems.

documentation

Drawings and other records that you must produce to document, obtain approval, or build the design.

drawing tool

Tool that helps in the process of creating, modifying, or manipulating objects. Examples are PinPoint and SmartSketch.

easting

A term that describes an east coordinate location in a coordinate system.

edge

A topological object that represents a trimmed curve bounded by a start and end vertex.

edge distance

The distance from the center of a bolt or rivet to the edge of a plate or flange.

equipment catalog

Catalog of equipment geometry and limited properties that the software uses to identify and visualize equipment and its placement in the model. The catalog is not the source for the total specification and ordering data for the object.

fabricate

To cut, punch, and sub-assemble members in the shop.

face-to-face

The overall length of a component from the inlet face to the outlet face.

fasteners

Bolts and rivets used to connect structural members.

element

Primitive geometric shape such as a line, circle, or arc.

fence

Boundary or barrier that separates or closes off an area. To surround or close like a fence.

field adjustment

Material added to the neat design geometry of piping or structural parts to allow for fit up in the case that extra material is required due to uncontrolled variance in the manufacturing and construction process.

flavor

A different variation of a symbol. Each variation has different occurrence property values.

focus of rotation

A point or line about which an object or view turns.

full penetration weld

A type of weld in which the weld material extends through the complete thickness of the components being joined.

function points

Part of the requirements documentation, function points are the smallest granularity of a requirement statement that describe specific detailed actions that the software performs.

functional block diagram

Schematic representation of a system (piping, electrical, ventilation) showing system parts and their relationship. You use symbols to represent equipment and components. A connecting network of lines illustrates their relationship. Taken together, the symbols and the network illustrate the function of the system.

furnishings

Parts such as movable articles and fittings that normally are not associated with a system (for example, a chair).

generic specific

Object that is parametrically defined or defined to suit a family of specific parts (for example, International Standards parametrics). For example, a 100 - 200 gpm pump in the catalog can provide a general shape to appear in the model until a specific object has been identified. See also specific and specific object.

GUIDs

Acronym that stands for Globally Unique Identifiers. The software automatically creates the GUIDs sheet in the Excel workbooks when you create the Catalog database and schema. The purpose of storing GUIDs within Excel workbooks is to help you keep track of what has been loaded into the database. Storing GUIDs also helps to avoid the situation in which a replacement Catalog database causes existing models to become invalid.

host location

The first location created for a Site. This host location is defined when the Database Wizard creates the Site database.

host server

The database server on which the Site database was created using the Database Wizard. Alternatively, if it is a restored database set, the Host Server is the database server where the Site database is restored. The Host Server in a Workshare environment contains the origin for the Site, Site Schema, Catalog, and Catalog Schema databases. Consequently, most Project Management and reference data work must take place at the Host.

initial design

Early stage of design work, generally before contract, used to estimate construction costs and provide a rough concept of the intended plant. Contains information relating to a plant created during its initial (concept) design period.

initial structural plan

Principal structural plan for the plant; also called a construction profile.

instantiation

Occurrence of a catalog object at a specific geometric location in the model.

interference checking

A process that identifies possible collisions or insufficient clearance between objects in the model.

job order

Industrial authorization for accomplishing work; synonymous with a work order.

kinematics analysis

Analysis of mechanical motion.

ksi

Kips per square inch.

leg length analysis

Preferred term is welding length analysis.

library

Resource of reference information that you can access in developing a plant design.

life cycle database

Information developed to assist in the maintenance and modernization of delivered plants.

link

Way to store information about another file in your document. You can update a link so that changes in the file appear in your document.

lintel

A horizontal member used to carry a wall over an opening.

load group

A grouping in which all components feature uniform load limits and stress safety characteristics. For example, if a pipe clamp from load group 5 has a maximum nominal load of 20kN, then so does a threaded rod from load group 5.

location

A Location is defined by three user-defined inputs: 1) a unique name, 2) a unique name rule ID, and 3) the server where the Site databases reside for that Location. A Location is defined and created when the Site database is created using the Database Wizard. Additional Locations can be created in the Project Management task. Each Location is a Site-level object, thus other Plants within the same Site collection can use the Locations when the Plants are configured for Workshare.

logical member

An object in the model used to represent the design topology.

machinery

Major pieces of equipment installed in a plant.

macro

A sequence of actions or commands that can be named and stored. When you run the macro, the software performs the actions or runs the commands. You can create the macros in Visual Basic or other OLE-aware programming applications. Some of the other OLE-aware programming applications are Visual Basic for Applications, Visual C++, and so forth.

maintenance envelope

A rectangular box around the part for clearance during maintenance operations.

maintenance records

Records of breakdown, repair, and overhaul of equipment.

material analysis

Analysis of a completed design work for extracting detailed material requirements; also called material lists.

material list

An option category that controls the format and content of the bill of materials.

methods

Objects in the database that describe the manufacturing methods to the component parts of a plant.

move from point

Starting point for an action. For example, when you move an equipment object, the Move From point determines the point of origin for the move.

move to point

Ending point for an action. For example, when you move an equipment object, the Move To point determines where you want the move to stop.

MTO neutral file

A non-graphic output file that can be fed into a material control system. MTO stands for Material Take-Off.

node

- One of the set of discrete points in a flow graph.
- A terminal of any branch of a network or a terminal common to two or more branches of a network.
- An end point of any branch or a network or graph, or a junction common to two or more branches.

northing

A term that describes a north coordinate location in a coordinate system.

nozzle

A piping connection point to a piece of equipment.

nozzle standout

The shortest allowable distance between the connection point of a nozzle and the start point of a turn on the leg connected to the nozzle.

NPD (Nominal Piping Diameter)

The diameter of a pipe.

object

A type of data other than the native graphic format of the application.

occurrence (of part or equipment)

Instantiation of a part of equipment in the model that refers to the part library; an instance of a specific object. The design can be built several times, and therefore the occurrence can apply to more than one hull. Typically, an occurrence points back to a specific object, either for its complete definition, as in the case of a particular valve, or for its made from material, as in the case of a steel plate part cut from sheets. Thus, when a designer selects a component from the catalog and places it at a location in the space of the plant, the software creates an occurrence of that object in the plant design.

occurrence property

A characteristic that applies to an individual object in the model. Occurrence properties are designated with 'oa:' in the reference data workbooks. You can view and modify occurrence properties on the Occurrence tab of the properties dialog boxes in the software. Depending on the object, some occurrence properties are read-only.

origin

In coordinate geometry, the point where the X-, Y-, and Z-axes intersect.

origin point

The point at which the coordinate system is placed, providing a full Cartesian coordinate system with positive and negative quadrants. Points are placed at coordinates relative to the origin point, represented by the X, Y, and Z values.

orthogonal

The characteristic of an element consisting completely of elements positioned at 90-degree angles. A square is an orthogonal element.

orthographic

A depiction of an object created by projecting its features onto a plane along lines perpendicular to the plane.

P&ID

Diagram that shows the topology, functional components, and special requirements of a piping system; generally represents the engineering design of the system.

package

Set of closely related classes. (UML)

painting

Computation of paint surface and recording of paint system requirements.

parameter

A property whose value determines the characteristics or behavior of something.

part class

A group of similar objects. You can define part classes in the Excel workbooks. A part class can have multiple parts. For example, a heat exchanger part class can contain heat exchangers with different dimensions.

part number

Unique identifier of a part.

PDS (Plant Design System)

A comprehensive, intelligent, computer-aided design and engineering application for the process, power, and marine industries. PDS consists of integrated 2-D and 3-D modules that correspond to engineering tasks in the design workflow.

PinPoint

Tool that allows you to place, move, and modify elements with precision, relative to a reference point.

principle of superposition

The principle that states that the stresses, strains, and displacements due to different forces can be combined. This principle is only valid for linear analysis.

Product Data Management (PDM) System

Software intended to manage both product data and documents associated to the product data. Functionality typically includes: object-based data modeling tools, user administration, business rules, and document management. Document management typically includes document editing or reviewing, document mark-up or redline, document storage, and full-text retrieval.

product structure

Hierarchical breakdown or decomposition of a product into constituent parts, volumes, or units. (For example, a bill of material is one possible type of product structure.)

production planning

Functionality associated with the work breakdown and sequence of the construction of a plant.

promotion

Process of associating approval state with a product version. A product version begins its existence at a working approval state. When the version is at some level of maturity, its approval state is elevated to a higher approval state (that is, promoted). Then, further changes must be carefully controlled and generally require the data set demoted to a working state. One or more promotions can occur successively higher approval states (between working and approved) to represent various intermediate levels of review or progressive approval.

query select sets

Set of objects that are selected in a query or queries on the database.

reference data

The data that is necessary to design plants or ships using the software. Reference data includes graphical information, such as symbols. It also contains tabular information, such as physical dimensions and piping specifications.

resource estimation

Rough estimate of material, manpower, and facility utilization for the design and construction of the plant.

route

1) A line connecting a series of points in space and constituting a proposed or traveled route. 2) The set of links and junctions joined in series to establish a connection.

satellite server

The database server where the replicated databases reside for Workshare. The Satellite Server is not used unless Workshare is activated.

schema

A database that creates the structure of another database. For example, a schema specifies the queries, tables, fields, and data types in a database.

schema update utility

Functionality used to assist in processing existing product models to an updated database structure after you modify or add to the database structure.

site

The top level in the Project Management hierarchy. A Site configuration may contain several Catalogs, each shared by multiple Plants.

site administrator

Person responsible for managing the standards and general parameters for a given plant site within a Site database.

site setup

Functionality associated with establishing a new plant site or hull for design development.

sketch and trace

User interface for rough definition of a required design feature that typically works in a 2-D mode.

specifications

Contracted requirements for the plant.

stud

A bolt, threaded on both ends, used to connect components.

suspended floor

A concrete floor system built above and off the ground.

symmetric node

Type of vertex on a curve. A curve with a symmetric node has the same curvature on each side of the node. A handle can be attached to a symmetric node for editing.

system

A conceptual design grouping that organizes parts in hierarchical relationships. A system represents a functional view of the model and includes information such as system name, type, properties, and design specifications for the objects assigned to the system.

tag number

User-specific, unique number assigned to an object (for example, CV-101 for a control valve, HE-2002 for a heat exchanger).

target point

The origin for coordinate measurements displayed by PinPoint. You can position the target point anywhere on the drawing sheet or view.

tolerant geometry

A type of ACIS geometry - either an edge or a vertex - that is outside the tolerance for ACIS and requires special handling.

trimmed surface

A surface whose boundary is fully or partially inside the "natural" geometric definition of the surface. Some or the entire control polygon extends outside the face boundary.

trunk

Feature that quickly reserves space for the distributive systems and other systems that have a path. Along the trunk are stations that define the cross section and identify part or system membership.

unit/module modeler

Facility of the system to structure collections of equipment and components into a single identifiable object.

user attributes

A customized property in the reference data. The Custom Interfaces sheets in the Excel workbooks define these properties. You can list the customized properties on the individual part class sheets.

version control

Ability of the system to manage multiple versions of a single part of the design. Version control should support conditional analysis and promotion status, as well as alternate design features among hulls within a plant site.

vertex

A topological object that represents a point in the three-dimensional model.

viewset

Set of objects (usually a subset of the entire database) that a view operation uses. Membership or lack of membership for any object in a viewset does not affect the actual stored representation of the object, but only its availability or desirability for viewing in the current scenario.

weight and CG analysis

Routines that compute the weight of commodity materials as configured in a given design (for example, plate and pipe) and determine total weight and center of gravity (CG) for a collection of material and equipment, as well as the complete plant.

welding

Weld requirements for joining materials. Welding length analysis is the calculation of required weld dimensions; also called leg length analysis.

wirebody

A topological object that represents a collection of edges jointed at their common endpoints.

wizard

Software routine attached to an application that provides guidance and expert help to you to complete one of the functionalities of the application.

work content

Estimation development of metrics from the database that relates to the work hour content of the various construction units.

work order

Plant authorization for completing work; synonymous with a job order.

working plane

The available 2-D plane of movement for endpoint selection.

workset

Set of objects (usually a subset of the entire database) used in an interactive change, add, or delete operation. Membership or lack of membership for any object in a workset does not necessarily affect the actual stored representation of an object. However, you can change or delete an object in a workset that also results in a change or deletion of the stored object. Similarly, when you add a new object (not currently stored) to a workset, the software also adds the object container.

workspace

Area that represents the portion of the model data needed to perform the intended task and includes the user modeling settings.

workspace document

Document into which you can extract a portion of the model data for a user task.

Workspace Explorer

Tree or list representation of objects in your workspace.

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